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NORTHERN NEW MEXICO OIL AND GAS ENVIRONMENTAL ANALYSIS RECORD
Albuquerque and Socorro Districts
(Exclusive of San Juan Planning Unit)

July 12, 1974

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Northern New Mexico Oil & Gas
Environmental Analysis Record
Albuquerque and Socorro Disircts
(exclusive of San Juan Planning Unit)

i. Purpose and Structure of Environmental Analysis

This environmental analysis is intended to identify impacts from oil and gas activities in the subject areas and to explore ways and means of minimizing adverse impacts. It will be used as a tool to assist the Bureau of Land Management (BLM) in carrying out its responsibilities with regard to oil and gas leases and operations. These responsibilities in association with United States Geological Survey (USGS) include processing of lease applications, drilling permit applications, notices to conduct exploration, notices to abandon wells, and various rights-of-way and Special Land Use Permits. These responsibilities are detailed in Secretarial Order 2948 (Attachment #10), and the BLM/USGS Field Guidelines for New Mexico, (Attachment #9).

The report is structured to be both a land management tool as well as an analysis of impacts. Environmental values are considered in the Bureau's planning and decision making system. These guidelines are to be used in evaluating and mitigating impacts on the environment. The decisions as to whether oil and gas activity might be restricted in certain areas are determined through the BLM planning process.

It should be noted that the BLM is currently preparing a Bureau-wide programatic environmental statement on the upland oil and gas leasing program. This statement will provide a thorough discussion and evaluation of the history, background, regulations, general impacts, etc. of the overall program. In addition, it will provide an in-depth discussion of alternatives, such as other energy sources.

It is hoped that the Bureau-wide environmental statement coupled with this specific environmental analysis will provide the necessary considerations and the proper protection for the environment in the report area.

I. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action

The proposed action is the continuation of oil and gas leasing on the national resource lands and mineral reserved lands within the area covered by Environmental Analysis Record.

The boundaries for this EAR are shown on the Map (Attachment #1). Within these boundaries BLM administers approximately 2.9 million surface acres and about 6.1 million subsurface acres.

The surface activities subsequent to leasing are drilling, production, abandonment, pipelines, powerlines, roads, continuous travel in the area, etc. (See procedures section under Recommended Mitigating measures for details).

B. Procedures

Many variables are involved in the actions covered by this analysis; however, the following is the general procedure to be followed when using this document:

1. Geophysical and Geologic Exploration

Geophysical exploration is any activity, relating to the search for evidence of oil and gas, which requires physical presence upon the land. It does not include core drilling for subsurface geologic information or drilling for oil and gas. Geologic exploration is any activity relating to the search for evidence of oil and gas.

Exploration crews must file a Notice of Intent with the District Manager, (Attachment #6). This requirement does not apply to a lessee or an authorized contractor for the lessee in conducting exploratory work within his leased area. The notice provides for BLM input to protect the environment under items 4 and 5 of this form.

After completion of exploration activities, the company must file a "Notice of Completion of Oil and Gas Exploration" with the District Manager. Within 90 days, the District Manager will notify the party who has conducted the operations if he must take corrective steps.

2. Leasing

At this point, it is necessary to be aware of the steps taken by the District Office upon receipt of a proposed lease from the State Office. When a particular parcel is described in a proposed lease, the District BLM personnel will refer to their maps, etc. to find the location of the proposed lease. When this is determined, the appropriate Unit Resource Analysis (URA), Management Framework Plan (MFP), and EAR sections will be referred to for

special problems and subsequent special stipulations to be attached to the prospective lease. Most of these stipulations are located in the "Recommended Mitigating or Enhancing Measures" section of this analysis.

3. Drilling Permits

This action takes place after a lease is issued. Leases issued after November 1972, include a standard set of open end stipulations which allow BLM to determine conditions of surface activity (Attachment #11). Applications to drill are filed with the USGS for approval.

Departmental Order #2948 Sec. 2 (a) (Attachment #10) requires The Geological Survey to consult with the BLM on the adequacy of the surface use, environmental protection, and reclamation aspects before approving any applications to drill, abandonments of wells, or certain other operations. The USGS requires that each Application for Permit to Drill be accompanied by a Development Plan for Surface Use (Attachment #7).

The BLM reviews the surface plan after receipt from USGS and then replies to USGS as to its adequacy and includes recommendations, if any. (New Mexico BLM and USGS Filed Guidelines, Attachment #9).

The surface activities subsequent to drilling are production, pipelines, powerlines, further exploration, roads, and finally abandonment.

4. Abandonment

"Notice of Intention to Abandon" are handled by BLM much the same as for drilling permits. BLM reviews the rehabilitation needed to restore the surface and works with the company on a rehabilitation plan. The EAR provides the basis for developing a plan or specific rehabilitation requirements.

5. Other Associated Actions

This EAR also provides a tool for BLM processing of other types of permits for facilities associated with oil and gas operations. These include rights-of-way for roads, pipelines, powerlines, etc. and "Special Land Use Permits" for certain facilities or operations. The EAR discusses possible impacts of these actions and provides recommendations for minimizing any adverse impacts. These recommendations will be incorporated into the various

permits in the form of appropriate stipulations.

C. Leasing Status of Lands

All lands subject to disposition under the Mineral Leasing Acts may be leased by the Secretary of the Interior. Lands may not be leased except with the consent of the agency having jurisdiction over the lands as discussed below. Land in incorporated cities, towns and villages are not subject to leasing under the above acts. Badland and frail land sites should not be leased if alternate sites can be selected.

The subject area includes all of the national resource lands (including subsurface federal minerals) of the previously described area except for the following sites; these sites may be restricted from leasing, (Attachment #3). These areas are relatively undeveloped and have outstanding recreational, cultural, natural and scenic qualities.

1. Rio Grande Wild River Area

The classification of Wild River includes approximately 50 miles of the Rio Grande and 4 miles of the Red River. Within this confluence zone, a high density recreation use area has been developed. Major resource use includes excellent cold water trout fishing; with nature interpretation, camping, and hiking as popular related outdoor recreation activities.

Many wildlife species are found throughout the area but those of particular significance include: bald eagle, peregrine and prairie falcon and various fish species.

2. Chama, Sabinosa, Canadian, Pecos River Canyons

The canyon area created by the Rio Chama is highly scenic containing sandstone bluffs towering over one thousand feet above the river bed. Excellent fishing, hunting and float boating opportunities are available.

These areas provide habitat for numerous wildlife species especially big game (deer, elk, antelope, and Barbary Sheep - Sabinosa only), tassel-eared squirrel (Sciurus aberti), various fish species mentioned, and raptors including the Bald Eagle, falcons, hawks and others.

3. Datil Spring

This is a 680 acre recreation area in the vicinity of Datil containing the Datil Well Campground. It is presently withdrawn from mineral location and leasing.

4. Malpais Natural Area

Contains cultural recreation and scientific features. The black and red lava beds surrounded by yellow sandstone cliffs present an unending variety of craters, fissures, cracks and holes. Unique vegetative types out of the ordinary have become established and thrived. Major resource values include excellent geological and nature interpretation, hiking and camping. Close proximity to a major southwestern metropolitan area further increases resource values for other than mineral utilization. Wildlife is well protected in this area due to difficulty in hunting. There are mule deer, wild turkey, tassel-eared squirrel, many raptors and other species too numerous to mention.

5. Cabezon - Guadalupe Areas

Geological, cultural and recreational values are unique in this area. The Cabezon peak, stands as a hard core of an extinct volcano along with other volcanic plugs in the area. Early Indian and Spanish culture and the remains of western settlements still cling to the area. Rock climbing, hiking, rockhounding and photographing are major recreation resource uses of the area. These areas are of importance to rock and cliff dwelling wildlife which include falcons, hawks, owls, bats, rock wren (*Salpinctes obsoletus*), wild turkey (*Meleagris gallopavo*), canyon wren (*Catherpes mexicanus*) and many other species.

Historical and cultural values are unique. The old ghost town of Guadalupe remains as a monument to the early Spanish settlement. Archeological ruins are significant and provide historical information dating earlier than the 12th century. The adjoining area to the west is being considered for wilderness classification.

6. Mineral Springs

Unique and scenic values include a ridge, cones, and a cave within an isolated canyon that has natural qualities.

This area has high value for wildlife. Wildlife is abundant, but those unique include, scaled quail (*Callipepla squamata*), desert

iguana (Dipsosaurus dorsalis), and the tarantula (Aphonopelma sp.).

7. Chiflo, Timber, Pot, Ute, San Antonio

Undeveloped, scenic, natural and wild values are unique to these isolated and prominent mountains. These areas except San Antonio Mountain provide much of the scenic backdrop. They are visible at great distances and are relatively close to the Rio Grande Wild River Area. Relatively undisturbed, these natural areas provide excellent habitat for many wildlife species. Antelope, deer and elk concentrate on these areas during various seasons of the year. The slopes as well as the adjacent brush and grassland are important winter areas. Recent investigations in this area discovered a significant amount of archeological materials related to the "Archaic" period. This material is important for both the scientific study of human systems and the recreational interpretive program for the upper Rio Grande.

8. Bisti Badlands

A particularly bizarre example of nature's hand is the Bisti region. Wind and water have carved a "Land of toadstools" from hard sandstone and soft shale deposited during Cretaceous time. Visitors may find dinosaur bones, fossilized turtles, petrified wood, oyster shells and thousands of balancing rocks.

Wildlife species unique to this area include various species of reptiles, birds of prey and other small mammals.

9. Tent Rocks

This area is characterized by steep canyons and ridges that have many unique and spectacular rock formations. Formations include cones, spires, pinnacles, and buttes of various sizes, shapes and colors, and many have intricately balanced stones atop them.

This area provides some winter range for mule deer and provides excellent cavity nesting sites for many birds and small mammals.

10. Cebolleta Mesa

This selected Potential Wilderness Study Area is small and is not awesomely spectacular, but it is an outstanding example of wild pinon-juniper breaks. The area has virtually no developments and is practically unvisited. Although it is not far from the metropolitan region of Albuquerque, it is in one of the most remote corners of the state. There are several springs in the area, one of which provides habitat for the tiger salamander. The area also provides golden eagle habitat. This fine area of rugged pinon-juniper breaks and rough, steep-sided canyons is certainly worthy of protection.

11. Chacra Mesa

This pinon and juniper covered mesa constitutes the predominant land form in the eastern portion of Chaco Canyon National Monument. The mesa extends from the monument approximately 30 miles to the east and forms the southeastern part of the Chaco drainage. This area contains a variety of archeological values. The most well studied resources are Basketmaker and Navajo Pueblo refugee sites. In addition, evidence of Archaic and Pueblo cultures have been identified. The Chacra Mesa archeological resources are considered highly significant, primarily for their research potential in the study of the development and the abandonment of the Chaco Canyon Pueblo pueblo villages.

12. La Ventana Mesa

The La Ventana Mesa area is comprised of several large sandstone mesa formations with intermingled drainage valleys, small canyons and foothill slopes of the Jemez Mountains. The area covers land on both sides of State Highway 44 at the site of the old town of La Ventana. The area comprised of approximately 36 square miles, is bounded on the east by the Forest Service line, on the south by the Indian Reservation boundary, on the north by Anoyo Penos and on the west by a line drawn a mile west of the La Ventana Mesa rim.

Vegetation is principally pinon-juniper and ponderosa pine, open grassland and some sagebrush. Annual precipitation amounts to approximately 14 inches.

The area has significant recreation potential. Currently, research and study are underway to determine how best the resources of the area can best be utilized for recreation development.

The area is used yearlong by mule deer. During the winter months the area is heavily used by deer and elk (elk use the eastern portion). This critical habitat is relatively undisturbed except for the chained areas which have generally improved the quality habitat. As a whole, the area provides habitat for a wide diversity of mammals, birds, reptiles and amphibians.

D. Authority

Oil and gas leases on federal lands, both public and acquired, are issued by the New Mexico State Office (Santa Fe), after consultation with the District and USGS, under the authority of the Mineral Leasing Act of February 25, 1920, as amended (44 Stat. 437, 30 USC 181 et. seq.), and the Acquired Lands Mineral Leasing Act of August 8, 1974, (61 Stat. 913; 30 USC 351-359). The regulations implementing the above cited acts are contained in 43 CFR 3100.

E. General Statistics

1. Current Extent of Oil and Gas Activity

Nearly all of the subject area is suitable for oil and gas leasing. The only areas in a Known Geological Structure (KGS) are in McKinley and San Juan Counties. Relatively little of the area has been leased. No major areas have been developed as significant oil and gas producing fields.

2. Types of Leases

Simultaneous oil and gas leases are for lands outside of KSG Areas. If more than one offer to lease is filed for a particular parcel, a public drawing is held at the end of the filing period. These parcels may be designated by the BLM or may result from areas where existing leases have expired, been terminated, were relinquished or had been cancelled.

Non-competitive over the counter oil and gas leases are also outside a KGS Area. The base action may be initiated by the applicant and may be issued providing he qualifies. They are issued without competition or drawing.

Competitive leases are issued for all lands within the boundaries of a KGS as defined by the USGS. Leases in such areas can be issued only as a result of a competitive oil and gas sale.

3. Well Spacing Regulations

Regulations governing the spacing of oil and gas wells are established based on data from discovery wells. Formation porosity and permeability, flow pressure, producing rate, depth of producing zone, lithology and type of oil, are all factors which are considered when the proper government authority determines the well spacing set. Development drilling in a field will be in conformity with government field spacing regulations, (Attachment #5).

As the fields develop, the wells are interconnected with a road and pipeline system. It is possible that sixteen oil wells per square mile could be drilled, resulting in at least 4 miles of road and 4-6 miles of pipeline system per square mile of field. The gathering system is a series of interconnecting flow lines which transport the produced oil and water or oil and gas to the central processing facilities. It is not unusual for 4-5 or more wells to be drilling at the same time, especially if there is more than one operator with leases in the field area. Gas fields have an usual well spacing of 160-320 acres per well. Production from different zones at other depths may increase the wells on a leasing unit.

? 640A for San Juan?

F. Planning Unit Information

The following URAs and MFPs have been completed for the area:

District and Planning Unit		URA Complete	MFP Complete
Albuquerque District			
1. Upper Rio Puerco PU	1-03	Yes	Yes
2. Cabezon PU	1-04	Yes	Yes
3. Malpais PU	1-12	Yes	Yes
4. Upper Rio Grande PU	1-01	Yes	Yes
5. Ojo-Caliente PU	1-02	Yes	No
6. La Cienega PU	1-11	Yes	No
7. Cebolla PU	1-10	Yes	No
8. Chaco PU	1-06	No	No
9. Sabinosa PU	1-13	No	No
10. Santa Fe PU	1-22	No	No
11. Northeast PU	1-23	No	No
12. Salado PU	1-14	No	No
13. Grants PU	1-19	No	No
14. Laguna PU	1-20	No	No
15. Lindrith PU	1-21	No	No

District and Planning Unit	URA Complete	MFP Complete
Socorro District		
1. Bosque PU	Yes	Yes
2. Stallion PU	Yes	Yes
3. Mulligan PU	Yes	Yes
4. Chubadera PU	Yes	No
5. Quemado PU	Yes	Yes
6. Cebolleta PU	Yes	Yes
7. Pellona PU	Yes	Yes
8. Driveway PU	Yes	No
9. Ladron PU	Yes	Yes
10. Mesa del Oro PU	Yes	Yes
11. Horse Springs PU	Yes	Yes
12. Divide PU	No	No
13. Alamo PU	No	No
14. Dry Lake PU	No	No

G. Stages of Implementation

Oil and gas operations and activities in the area follow a recognized four step sequence of: exploration, development, production and abandonment.

1. Exploration

Many of the exploration activities which affect the land, resources and environment take place prior to the issuance of a lease and therefore, pre-lease and post-lease operations will be analyzed and described separately. Almost all drilling in the subject area would be in a wildcat leasing area. The following is a brief description of exploration practices. (For more detailed information see Programmatic Environmental Statement, Upland Oil and Gas Leasing).

Pre-leasing exploration operations conducted prior to obtaining an oil and gas lease may be segregated into two categories. Airborne exploration, which does not require physical presence on the ground and surface exploration, which requires either casual or intensive activitiy on the ground. Casual activities include the use of existing roads and trails to conduct a variety of surveys. Intensive use may result in disturbance of the environment to varying degrees. Construction of temporary access trails, clearing of the vegetative cover for an exploration site or movement of heavy equipment and vehicles cross country characterize intensive use.

There are a number of geophysical surveys which may be conducted during the exploration phase, examples are:

a. Explosive method

b. Thumper method

c. Vibrator method

In the explosive method, a truck mounted drill is used to drill holes 100 to 200 feet deep on 600 to 1,400 foot spacing. The holes are loaded with 5 to 50 pounds of explosives and detonated. The same hole may be reloaded and shot numerous times to find an optimum depth and explosive charge to return the best reflection or refraction signal possible.

The thumper and vibrator method both use truck mounted equipment as an energy source to pound or vibrate the earth. All three seismic methods use recording equipment or detectors which are placed on or in contact with the ground at spaced intervals to record the time it takes the impulse energy to be returned from the subsurface.

Exploration operations subsequent to obtaining an oil and gas lease are conducted by drilling operations to discover hydrocarbons. Drilling operations that fall in the category of exploratory "wildcat" wells are approved by the USGS only after an environment analysis is made that has the concurrence of BLM and has resulted in a determination that such action does not constitute a major federal action significantly affecting the environment in the sense of NEPA, Section 102(2) (c).

The location of the well site is derived after consideration is given to geophysical exploration data in conjunction with subsurface data gathered from previous wells drilled in the area. Once a site has been selected, a road is built that can support the drilling rig and other equipment that must be moved to the location. The most economical route is desired by the operator. These roads are not designed for permanent access until production is established in an area. The well site covers an area ranging from 200 x 200 feet up to 300 x 300 feet (approximately 1-2 acres) which is cleared of vegetation and graded to a flat surface. Depending on the soil in the area, the drill pad and roads may or may not be gravelled. At the well site, the drilling rig, mud pumps and tanks, reserve pit, generators, pipe rack, and tool house are located on the drill pad. Other facilities, such as storage tanks for water and fuel, may or may not be located on the drill pad; however, they will be located nearby.

One key to successful rotary drilling is the washing of the hole by fluid (referred to as mud), continually pumped down the drill pipe to remove drilled cuttings. Basically, drilling mud performs the functions of (1) removal of cuttings from the well, (2) maintenance of sufficient hydrostatic pressure to prevent entry of high pressure hydrocarbons or water from drilled formations, (3) keeping the drill bit cooled, (4) holding cuttings in suspension when circulation is temporarily stopped, (5) aiding in the prevention of caving of soft formations by means of the density and plastering properties of the mud, (6) reduction of the amount of water lost from the drilling fluid to the formations drilled by plastering the walls of the hole, (7) supporting part of the weight of pipe in the hole, and (8) release of cuttings as easily as possible when at the surface. Drilling fluids have weight, viscosity, gel-strength, wall-building and filtration rates, electrical resistivity, and chemical properties.

When drilling with mud, the drill cuttings from certain formations are caught (sampled) at given intervals and examined by a geologist to detect hydrocarbons and to obtain geologic correlation. If the drill cuttings give a good indication of oil or gas, the geologist may recommend testing the interval from which the samples came. Testing is usually done by (1) a "drill stem" test shortly after drilling through such interval, and/or (2) at completion of drilling by casing the hole, selectively perforating, fracturing the formation, and testing.

During drilling operations, certain strings of casing are placed and cemented in the hole. They are classified in the basic categories of surface casing, intermediate casing, and production casing. Each string of casing serves an important part in drilling and completion operations.

At the completion of testing and drilling, the well is logged. This is an operation wherein some characteristic data of the formations penetrated by a borehole are recorded in terms of depth. In oil and gas operations, the five prevalent varieties of well logs are electrical, radioactivity, sonic, sample, and mechanical. The well logs provide information which is used in the completion process of the well.

Well completions fall into three basic categories: (1) open hole completions, (2) liner completions, (3) perforated casing completion. In brief, (1) the open hole completion method calls for production casing to be set above the zone of interest prior to drilling same, and the well is completed with the producing interval open to the well bore; (2) the liner completion calls for casing to be set above the producing zone, and an uncemented screen and liner assembly is installed across the pay section (producing interval); or, after the pay is drilled with casing

above it, a liner casing is cemented in place and perforated; (3) production casing is cemented through the producing zone and the pay section is selectively perforated.

After perforating, the pay zone is treated or fractured in the hope of stimulating production.

The drilling rig and much of the support equipment is moved away from the well site, either after the casing is cemented in the hole or after the producing zone is treated.

Any oil well completion from a producing zone could result in a well which may have to be pumped from the initial stages of its life, or it may have a flowing life followed by a period of mechanical lift.

If the well is a gas discovery, the operator will vent or flare the gas for a short period to clean up the well and to test the well's capabilities. A gas well will then be shut-in waiting for connection to a gas sales line.

2. Development

After a discovery of a new field, subsequent wells will be drilled until the reservoir limits of commercial production are established. Such wells will be drilled on an established spacing regulated by governmental agencies.

The drilling of all wells where a federal oil and gas lease exists is subject of USGS approval. Attached to and made a part of an application to drill is a "Development Plan for Surface Use," which must receive the concurrence of the BLM before any development drilling activities can be initiated in areas under BLM jurisdiction. (See Attachment #5 for plan requirements).

In the event a new field is discovered it could be unitized. Basically, unitization is the pooling of interests in one or more reservoirs with one company being responsible for all operations. Production is allocated to lands in participating areas, and production is controlled to gain the maximum recoverable hydrocarbons. Several of the units covering oil reservoirs are in a stage of secondary recovery and are rapidly declining in productiveness.

The drilling of development wells will require additional access roads and well sites; however, these will usually be of a per-

manent nature with a stable base, and their location and construction methods better planned than for exploratory wells.

If the discovery is gas, environmental disturbances may be significantly less since gas wells are normally drilled on larger spacing and usually do not require the surface facilities that oil wells do.

The impact due to field developments does not increase proportionately with each new well since many existing roads and facilities may be used. As each well is drilled, additional subsurface data is obtained and analyzed. This data is correlated to enable the operator to change his development plans and also to reduce the number of unnecessary wells.

Many fields go through several development phases -- that is, some of the new development wells may be drilled past the known producing horizon in an attempt to find additional pay zones. If a deeper pay zone is developed within a field area, there may be additional wells drilled adjacent to existing producing wells, or in some instances existing wells may be drilled deeper and used as a multiple completion. Each additional deeper pay zone usually requires a more complicated completion with additional storage and treatment facilities.

3. Production

Production begins when the oil and/or gas can be marketed, whether by a pipeline system (oil or gas) or by trucking (oil).

During the production life of a field, a continuing study of the producing reservoir is pursued to obtain data for possible use by the operator to recover additional volumes of oil, and to help in selecting the optimum time for secondary recovery initiation.

The surface production facilities depend on several factors, such as oil or gas production, phase of production (initial or secondary), depth of production, volumes being produced, and mixture of fluids being produced. Such facilities may consist of one or more of the following: (1) a well head, (2) pumping equipment, (3) a separation system, (4) flow lines, (5) a meter system, (6) storage facilities, and (7) water treatment and injection facilities.

Well Head - Well heads consist of several different combinations of equipment which may include a casing head, casing hanger, intermediate casing head, tubing head, tubing hanger, tubing adapter, valves, tees and crosses, chokes and flow controls, and tree top.

Pumping Equipment - The most common type of oil or fluid lifting type equipment is the sucker-rod pumping system with the pumping motion supplied at the surface by a pumping jack.

Separation System - Inasmuch as gas and oil, oil and water, or even gas, oil, and water occur together in the well bore, their separation at the surface is a basic problem. Various type separation equipment and systems do this and are found at well and tank batteries. The equipment falls into classes of separators, stabilizers, scrubbers, heater treaters, and precipitators.

Flow Lines - Flow lines go from the well head and/or well location facilities to a sales transmission line in the case of gas; and for oil, the lines go to storage tanks which may be at the well location or centralized at a common storage tank battery.

Meter System - Gas produced goes through a meter run and/or meter house where the volume, temperature, and pressure are recorded. The meter house is usually a small tin shed. Oil produced can be manually gaged and transported either by truck or through a sales line; or it can go through a lease authomatic custody transfer to a sales line. The automatic custody transfer system is merely equipment and instrumentation to transfer custody of oil to a pipeline at a producer's lease without a representative of either having to be present and with all measuring and testing done automatically.

Storage Facilities - Surface storage tanks for oil may vary in size from 210 barrel tanks, usually found at individual wells, to several hundred-barrel capacities. This depends on total well or lease production and whether the oil is marketed from the well site or from a lease tank battery system. Some of the lease stoarge batteries will have fire walls constructed around them (dirt dikes). It is common practice to construct open pits in association with storage facilities to bleed off basic sediments and water. Such pits are normally fenced for protection of livestock and wildlife.

Water Treatment and Injection Facilities - Secondary recovery of oil reservoirs is done primarily by water flooding. In general, surface facilities may consist of a combination of (1) tanks for storage and treatment of water produced with the oil production, (2) a water supply well, (3) aeration and/or sedimentation ponds, (4) chemical treater, (5) a filtering system, (6) clear water storage, (7) injection pumps, (8) metering system, (9) an injection well.

4. Abandonment

The abandonment phase begins near the end of the production phase, or when production is too low to pay operating costs. As production declines and secondary recovery involving water injection progresses, some wells begin producing high volumes of water and they are usually shut in or abandoned.

When production reaches the point where oil or gas can no longer be recovered economically, the operator requests permission from the USGS to plug and abandon his well or wells. The operator must submit an abandonment plan outlining the proposed procedure. The Oil and Gas Supervior determines if it is in the interest of conservation to allow abandonment or if additional resources can be recovered by any known techniques. (See Attachment #8 for Sample Application). The abandonment must provide for restoration and rehabilitation of disturbed soil and resources as provided for in the lease stipulations. The BLM is contacted for recommendations as to the necessary surface restoration methods. Much of the gathering system flow lines and other buried pipe will be left in place as the cost of removal will exceed the salvage value.

If the lease is relinquished or expires, the BLM must prepare a report either accepting the rehabilitation as adequate or rejecting it and outlining any problems or deficiencies. The lease bond is terminated only when the BLM and USGS are satisfied the lease stipulations have been complied with.

H. Alternatives

The cessation of oil and gas leasing is the only alternative. This decision would require an eventual drastic reduction in the American standard of living or a turn to alternative energy sources. A partial list of sources is as follows:

a. Increased oil imports

b. Increased onshore oil and gas production

c. Increased OCS production

d. Increased nuclear power

e. Increased use of coal

f. Increased hydroelectric power

g. Oil shale production

h. Wellbore stimulation for recovery from known deposits

i. Synthethic natural gas and oil

j. Increase gas imports

k. Geothermal

These alternatives are beyond the scope of the EAR. However, they are covered in detail in the following documents:

--Final Environmental Statements FES 73-19; Proposed 1973 Outer Continental Shelf East Texas General Oil and Gas Lease Sale

--Programmatic Environmental Statement, Upland Oil and Gas Leasing (currently in draft).

--Energy Alternatives Document (currently being prepared by the Department).

II. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. Non-Living Component

1. Air

The area has a semi-arid continental climate with mild summers. Most summer temperatures reach 90° (less than 30 days a year) and up to 100° above 6,500 feet in elevation. Minimum average temperatures in winter are usually near freezing but a few days reach near or below zero in the low areas and below zero in the higher areas. In general temperature varies directly according to elevation. There is a decrease in average temperature of about 3° per 1,000 feet in elevation. The plains and other lower elevations have frost free periods of from 120 to

180 days, while higher elevations have frost free periods extending from 90 to 100 days. The average frost free periods are directly related to the elevation. Sunshine occurs on an average of about 75% of the time. Average annual relative humidity is around 45%. The average annual evaporation is about 100 inches.

Wind is seldom a problem except in the spring. An average wind speed of 12 miles per hour is estimated for the area predominately from the southwest. Winds are stronger in the spring and lighter in the fall. Winds of 25 miles per hour or greater occur for 5% of a given day or year. With dry ground conditions, these wind speeds may cause blowing dust and soil erosion.

Although the report area is quite large, the air quality will be very homogenous over most of the subject area. The immediate areas around larger population centers (especially Albuquerque) are exceptions. There are spring wind storms which occasionally generate dust and temporarily lower the air quality in the valley and plains. Other than occuasional blowing dust, particulate matter and other air pollutants in the air are not significant except around large cities.

2. Land

The subject land is generally comprised of rolling plains, mesas, canyons, and river drainages which are intersected by mountain ranges. Elevations generally range from 4,500 to 7,500 feet throughout the area concerned with this report.

The northeastern New Mexico plains are dissected at wide intervals by shallow to deep drainages and canyons that are dry most of the year. The plains areas in the northwest part (east of the Navajo Reservation) are most often rolling. Other northern lands in the central part are more steeply rolling with steeper and more numerous drainages.

In the southern part (Socorro district) there are three large closed basins (Jornada, San Augustine Plains, North Plains) that are nearly flat plains surrounded by mesas and mountains. The remainder of the southern portion is mainly rolling country with intermingled mesas, ridges and mountain ranges.

There are several major river drainages containing wide, deep and rough canyons. This is typical of parts of the Rio Grande, Red River, Pecos, Chama, Red, Canadian and Cimarron Rivers.

Adjacent to these river drainages are frail lands and breaks found intermittently along the river courses. These frail steep areas and other similar areas are more critical for watershed protection as shown on the Erosion Hazard Map (Attachment #1). These areas are sites of steeper topography, soils of low infiltration rate and are highly susceptible to gully erosion due to soluable salts in the soil profile. The balance of the subject area (gently rolling, mesa tops, etc.) is affected only slightly by erosion.

Volcanic activity of a comparatively recent age is found in a lava flow south of Grants where one hundred twenty thousand acres of unique cindercones, craters, tubes and specialized vegetation is found. This central and southwestern part of the subject area contains many old cindercones and craters.

Soils are highly variable because of the wide range of parent material and climate. Parent material is principally volcanic, sedimentary and igneous in origin. Research reports by the New Mexico State University indicate about half of the area lands have topography and soils that are suitable for irrigation (if water were available). The majority of such soils lie in the plains and basin areas and are sandy loams, loamy sands, loams, clay loams and sandy clay loams. Sandy loams soils predominate. Mountains, ridges and mesa slopes are predominately miscellaneous rock land and stony land types. Soil colors are many shades of brown, gray, red and yellow. Black soils are rare.

There are certain areas that are most critical for many of the wildlife species considered in this environmental analysis. These areas include:

> The river, stream, lake, reservoir, spring banks, gravel and sand bars, boulders, riffles, shaded pools, marshland, mud flats, tules, irrigation ditches (adjacent to water areas) and dried up river and stream beds. Shrublands (within 1 to 2 miles of water), brushy draws, canyons and arroyos, ponderosa pine (adjacent to broken mesas and canyons), riparian vegetation, mesa edges and bluffs (that have rock outcrop, ledges, cliff faces and crevices), mesa tops (within 200 yards of edge), slopes, draws, rocky hillsides within the pinon-juniper and ponderosa pine type.

3. Water

Precipitation is controlled by the semi-arid climatic conditions that predominate. Moisture for summer rains comes by way of the

southeasterly air circulation from the Gulf of Mexico. Condensation is caused by convective air currents which result from strong surface heating and lifting of the air as it moves over higher terrain. Winter precipitation falls from storms moving west to east from the Pacific Ocean moisture source.

Precipitation varies directly according to elevation. Annual precipitation is about 8 inches at elevations of around 4,500 feet along the Rio Grande River in Socorro County. Precipitation increases up to 20 inches at about 7,500 feet in the foothills of the eastern slopes of the Sangre de Cristo Mountains. Precipitation of the northeast plains, parts of Colfax, Mora, San Miguel, Union and Harding Counties, generally ranges from 12 to 20 inches depending on elevation and local wind patterns. Southern, central and western parts of the subject area generally receive from 8 to 14 inches of moisture in the plains and rolling hills (precipitation increases in proportion to elevation).

The water resources in the subject area are varied. Perennial flowing rivers of significance are the Rio Grande, Rio Chama, Rio Puerco, Red, Cimarron, Canadian, Mora, Pecos, and Los Pinos Rivers. Numerous other drainages flow intermittently. There are many seeps and springs of importance to wildlife and livestock. Major lakes (all man made) include, Santa Cruz, Ute, Elephant Butte and Conchas Reservoirs. Small mountain lakes are numerous in higher elevations. The perennial streams in the area all originate on the high mountains of the northcentral part where precipitation is higher and where snowfall accumulates. Some of the more important streams include: Rio del Medio, Pojoaque, Rio de Truchas, Rio Frijoles.

Natural waters are supplemented by thousands of deep wells and earthen livestock reservoirs. The majority of municipal water comes from wells. The sparse and scattered permanent waters are an important contributing factor to low wildlife populations in some areas.

There are major differences in the quality, quantity and source of water. There differences are explained below. The upper part of the Rio Grande Basin and eastern plains area are very different from the lower Rio Grande Basin and the Chaco-Socorro part of the report area.

The water quality and quantity is generally better in the Upper Rio Grande and eastern plains area. Most of the water is potable. Water is usually available in all areas by way of wells. In the river valleys the wells are quite shallow (30 to 80 feet) while in the plains and plateau areas the wells range from 200 - 500 feet with some up to 1,000 feet deep.

I

Numerous earthen stock water reservoirs exist but few of these have year long water. The main rivers include the Rio Grande and Canadian River Valleys and associated lakes or reservoirs. In the remainder of the Upper Rio Grande and eastern plains area, there are numerous high mountain and plateau lakes or reservoirs.

Within the Chaco-Socorro portion of the subject area, abundant water is only found in the southern Rio Grande Valley. The remainder of the area, except for a few local places where large seeps or abundant shallow water occurs, is characterized by a sparse and variable supply of spring and well water. The water is usually potable. Most of the wells for domestic and stock water are 200 to 400 feet deep and yield less than 15 gallons per minute. A few areas are served by wells up to 1,000 feet deep. There are many earthern stock water reservoirs few of which furnish year long water. Most of the Chaco area is semi-arid having only 5 to 6 inches of annual precipitation, however, some recent mineral exploration holes north of Crownpoint have encountered significant (200 - 300 GPM) amounts of underground water.

B. Living Components

1. Plants

a. Aquatic

Aquatic plant life (phreatophytes) for the purposes of this report are those growing in water or on land with their roots in the water table (Attachment #2). Plants growing in water consist principally of plankton, mosses, water-grasses, sedges, algae and many other species. Phreatophytes, principally found along river valleys such as the Rio Grande and the Pecos Rivers, are also found near seeps and springs. The more noticeable species include cottonwood, tamarisk, willow and Russian olive.

These aquatic areas usually consist of several habitat types or vegetative types. The most common habitat types found in the subject area are as follows:

(1) Riverbank type - Riverbank vegetation generally consists of low growing plants which form a narrow band only a few feet wide. Characteristic species include jointed horsetail (Equisetum spp.), spikerush (Eleocharis spp.),

(a) C

Kentucky bluegrass (*Poa pratensis*) and cocklebur (*Xanthium* spp.).

(2) *Riparian shrubland type* - This type is associated with poorly drained areas that are adjacent to the river and drainage ditches. Dominant vegetation is usually coyote willow (*Salix exigua*). In the wetter areas of this type, there are small clumps of cattails (*Typha latifolia*), bullrush (*Scirpus* spp.), smooth scouring rush (*Equisetum laevigatum*), sedges (*Carex* spp.) and other hydric plants. Salt cedar replaces coyote willow in some of the more alkaline areas. Rio Grande cottonwood (*Populus wislizeni*), saplings, Russian olive (*Eleagnus angustifolius*) and patches of peach-leaf willow (*Salix amygdaloides*) and Pacific willow (*Salix lasiandra*) are also characteristic vegetation of this type in a few areas.

This type is present throughout most of the valleys on gently sloping banks adjacent to rivers. The size of this type may vary from as much as a small clump of 4 to 5 feet to several hundred feet or more. Most stands of vegetation characterized by this type are very dense and nearly impassible.

[i]

(3) [i] *Riparian woodland type* - This is the most extensive native riparian type. The dominant plant is Rio Grande cottonwood. The vegetation composition within this type varies. The cottonwood trees are the most noticeable and range from 40 feet or more in height. The dominant understory usually consists of some variety of brush that forms fairly dense stands from 5 to 15 feet in height. Often associated with this subtype are clumps of New Mexico olive (*Forestiera neomexicana*), skunk-bush (*Rhus trilobata*), greasewood (*Sacrobatus vermiculatus*), rubber rabbitbrush (*Chrysothamnus* spp.) and occasionally rose (*Rosa* spp.). In the bottoms of larger arroyos there may be found an occasional narrow-leaf cottonwood (*Populus angustifolia*) and box elders (*Acer negundo*). The riparian woodland is found in relatively undisturbed areas of valleys and canyons. This type may extend anywhere from 20 to more than 500 feet in width. The dominant understory plants include: Russian olives, New Mexico olives, Chinese elm (*Ulmus parvifolia*), tamarisk, coyote willow and other species mentioned previously.

In the wetter areas, extremely dense thickets of the above vegetation and occasionally Pacific and peach-leaf willow are present. Virginia creeper (Parthenocissus) ditacea) and western virgindower (Clematis ligusticifolis) are also present in the wetter areas praticularly along hillsides. In these wetter areas the density of the understory becomes greater.

A variety of herbs are present within the riparian woodland type. These include: Kentucky bluegrass, fox-tail barley (Hordeum jubatum), streambank wheatgrass (Agropyron ripariun), Canadian wildrye (Elymus canadensis), cocklebur, asters (Aster spp.), Russian thistle (Salsola kali), sunflower (Helianthus spp.), beeweed (Cleome spp.).

Marshland type - Marshes within the subject area range in size from 10 to 40 foot strips adjacent to drainage ditches, riverbanks, ponds, lakes, reservoirs, etc. Most of the marshes are shallow with little or no open water, but a few have small open areas (often brackish) which are several feet in depth. Characteristic plants include: cattail, bullrush, sedges, flat sedge (Cyperus spp.), spikerush and other emergence species. In some areas the extent of natural marshland is slight compared to more northern areas where water is more abundant. Some of the marshes are a result of mans activities (agriculture and resultant incomplete drainage).

b. Terrestrial

The vegetative zones or types are determined to a large extent by microclimate, topography, soil and elevation. The major vegetative types are: sagebrush, grasslands, woodlands, creosote and a nonriparian shrubland (Attachment #2). All of these vegetative types occur in some areas as mixed vegetative types.

Sagebrush type - Sagebrush types are found in more or less pure stands within the north central areas on the flats between the Sangre de Cristo Mountains and the Carson National Forest and in smaller areas extending west on Highway 44 south of Farmington and north of Grants. Both the big and little sagebrush (Artemisia spp.) is found in the sagebrush type. Associated grasses include: western

wheatgrass (*Agropyron smithii*), galleta grass *Hilaria jamesii*), blue grama (*Bouteloua gracilis*), sand dropseed (*Sporobolus cryptandrus*) and others.

Grassland type - The grasslands are present on the hilly or flat areas adjacent to the valley floor. The most important grass species include: blue grama, western wheatgrass, galleta grass, sand dropseed, alkali sacaton (*Sporobolus airoides*), buffalo grass (*Buchloe dactyloides*), Indian ricegrass (*Oryzopsis hymenoides*), blue grasses (*Poa* spp.), fescues (*Festuca* spp.) and a variety of forbs.

Pinon-juniper type - This vegetative type is wide spread and found on most types of terrain excluding the river bottom lands. These areas include: rolling hills, deep slopes, mesa tops, flat lands, canyons and ridges. In the plains areas east of the southern Rocky Mountains, this type is found on rough broken lands, canyons and mesas. In the north central parts of the subject area, pinon-juniper dominate the aspect of the lower slopes, ridges, mesas and canyons. The previously mentioned grasses are also found though many of the openings are dominated by sagebrush. The central and southern parts contain larger areas of grasslands which leave the pinon-juniper type generally confined to rocky ridges and dissected mesa slopes.

This vegetative type is characterized by pinon (*Pinus edulis*) and juniper (*Juniperus* spp.) as the major overstory species. The understory is characterized by big sagebrush, serviceberry (*Amelanchier* spp.), oaks (*Quercus* spp.), antelope bitterbrush (*Purshia tridentata*), mountain mahogany (*Cercocarpus montanus*), greasewood, rabbitbrush, and snakeweed (*Gutierrezia* spp.).

Open or park-like pinon-juniper areas occur with grass in thin understories and in small openings. These grass species consist of: grama, sacaton, western wheatgrass, galleta, dropseeds, bluegrasses, fescues, other grasses, many forbs and annuals.

This woodland type varies in tree density from dense pure stands to park-like areas. The dense areas have accumulations of needles (duff) on the soil surface that effectively discourages the growth of other vegetation.

Pockets of ponderosa pine are found associated with pinon-juniper and other favorable sites within the transition zone. Extensive mountainous areas usually support ponderosa pine stands in a higher elevation where adequate precipitation occurs. Favorable aspects within ponderosa pine forests have stands of douglas fir and spruce. Ponderosa pine is usually more abundant on south facing slopes whereas douglas fir is more abundant on north facing slopes.

Creosote bush type - The creosote type is found along the Rio Grande river valley south of Bernalillo. It lays on dissected outwash lands between the alluvial valley and the lower foothills that parallels the river. Soils are gravelly. North facing slopes of arroyos crossing the outwash often support good stands of galleta grass and bottoms of washes have brush species such as: chamise, rabbit brush, grey oak, and skunk bush.

Nonriparian shrubland type - This type is often found along the flood plains of arroyos and on adjacent slopes. Characteristic vegetation is greasewood, rabbit brush, four-wing salt bush (Atriplex canescens), and sagebrush species. The variety of grasses and forbs characteristic of grassland areas are also present.

Lava flow type - On the lava flow south of Grants, called the Malpais, there is a unique vegetative type. The area covers some 120,000 acres. The vegetation includes an overstory of ponderosa pine in the older flow areas and an understory of Apache plume (Fallugia paradoxa), skunk bush and other low brush in the more recent flow areas. Grasses including blue grama and muhly, many forbs and annuals grow as part of the understory where soil accumulations permit.

2. Animals

a. Aquatic

The aquatic areas include perennial waters and ephemeral waters and other small segmented and scattered ponds and reservoirs throughout the subject area. The water quality for fish is very good except for the Rio Puerco, the Rio Grande (from the confluence of the Chama to Elephant Butte Reservoir) and Chico Wash. The most common species of

fish that are found in the higher quality waters include: rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), channel catfish (*Ictalurus punctatus*), carp (*Cyprinus carpio*), Rio Grande cutthroat (*Salmo clarki virginalis*). The latter two species are only found in the warmer section of the rivers.

The waters north of the Chama and Rio Grande confluence are classified as cold water fisheries. The lower the confluence the water becomes warm fisheries. The Pecos River is classified as a warm water fishery.

Bird life is also abundant in aquatic areas. The more numerous species include: mallard (*Anas platyrhynchos*), blue-winged teal (*A. discors*), green-winged teal (*A. carolinensis*), buffelhead (*Bucephala albeola*), and other species of waterfowl. Birds that depend on aquatic areas and adjacent lands include: American avocet (*Recurvirostra americana*), belted kingfisher (*Megaceryle alcyon*), dipper (*Cinclus mexicanus*), peregrine falcon (*Falco peregrinus*), bald eagle (*Haliaeetus leucocephalus*), sharp shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperii*). The latter two are associated with stands of deciduous trees along water ways and wetter sites such as near springs and seeps. Many other birds (wading, waterfowl) are listed in the Red Book by Division of Wildlife Services as status rare, undetermined.

Animal species that are associated with aquatic areas are numerous. Only a few will be listed here, these include: muskrat (*Ondatra zihethica*), mink (*Mustela vison*), beaver (*Castor canadensis*), racoon (*Procyon lotor*).

Reptiles and amphibians are also numerous, these include: snapping turtle (*Chelydra serpentina*), painted turtle (*Chrysemys picta*), pond slider (*Pseudemys scripta*), softshell (*Trionyx* spp.), bull frog (*Rana catesbeiana*), tiger salamander (*Ambystoma tigrinum*), many-lined skink (*Eumeces multivirgatus*), smooth green snake (*Opheodrys vernalis*), milk snake (*Lamtropeltis triangulum*) and many other species.

There are many species of invertebrates which include: backswimmer (*Notonecta undulata*), water strider (*Gerris* spp.), giant water bug (*Abendus* spp.), damsel fly (*Lestes* spp.), dragon fly (*Libellus* spp.), mosquitoes (*Culex pipens*) and water boatman (*Arctocorixa interrypta*). Invertebrates associated with lands adjacent to the aquatic areas include: metalic leaf-beetle (*Chrysochus auratus*), lady bug (*Hiptodamia convergens*), swallowtail (*Patilio turnus*), bumble bee (*Bombus* spp.) and many others.

b. Terrestrial

Domestic livestock exert the greatest animal influence on the environment within the subject area. This is due to the wide spread distribution of these animals over virtually all of the lands involved in this report. Primary livestock using the area are cattle, sheep, horses, goats and burros. Livestock (utilization, trampling seed distribution, fecal droppings, etc.) dominates the use of open the rangeland area. Wildlife use becomes more dominant in areas that provide more diverse vegetation.

Other domestic animals such as cats and dogs are also present in local areas in close proximity to most all of the scattered communities.

Of course, man is also present and through his manipulation of practically all segments of the environment is directly and indirectly involved in the total happenings within the existing environment.

Wildlife species associated with terrestrial habitats will be listed under the habitat type in which it is most commonly found. Each habitat type or vegetative type supplies habitat components that will satisfy many different species of wildlife. For the sake of simplicity, only those major species will be noted.

Sagebrush type - Many species are associated with this vegetative type. A few of the major species are: mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), antelope (*Antilocapra americana*), barbary sheep (*Ammotragus lervia*), spotted bat (*Euderma maculata*), coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), and many other shrews, squirrels, gophers, mice, rats, rabbits, birds, reptiles, amphibians and invertebrates.

Grassland type - Those species commonly associated with grasslands include: elk, antelope, prairie falcon (*Falco mexicanus*), prairie dog (*Cynomys* spp.), many bats, squirrels, rats and rabbits, ferruginous hawks (*Buteo regalis*), other raptors and many birds, reptiles, amphibians and invertebrates.

Pinon-juniper type - Those species most commonly associated with this vegetative type include: mule deer, elk, antelope,

barbary sheep, spotted bat, several species of skunk, fox, squirrels, gophers, rabbits, birds of all kinds, reptiles, amphibians and invertebrates.

Creosote type - Those species associated with the creosote type include: black-throated sparrow (Amphispiza bilneata), Couch's spade-foot toad (Scaphiopus couchi), desert spiny lizard (Sceloporus magister), western black-headed snake (Tantilla planiceps).

Lava flow type - The wildlife most commonly associated with this unique terrestrial area include: mule deer, turkey (Meleagris gallopavo), roadrunner (Geococcyx californianus) many other birds, bats, reptiles, amphibians and invertebrates.

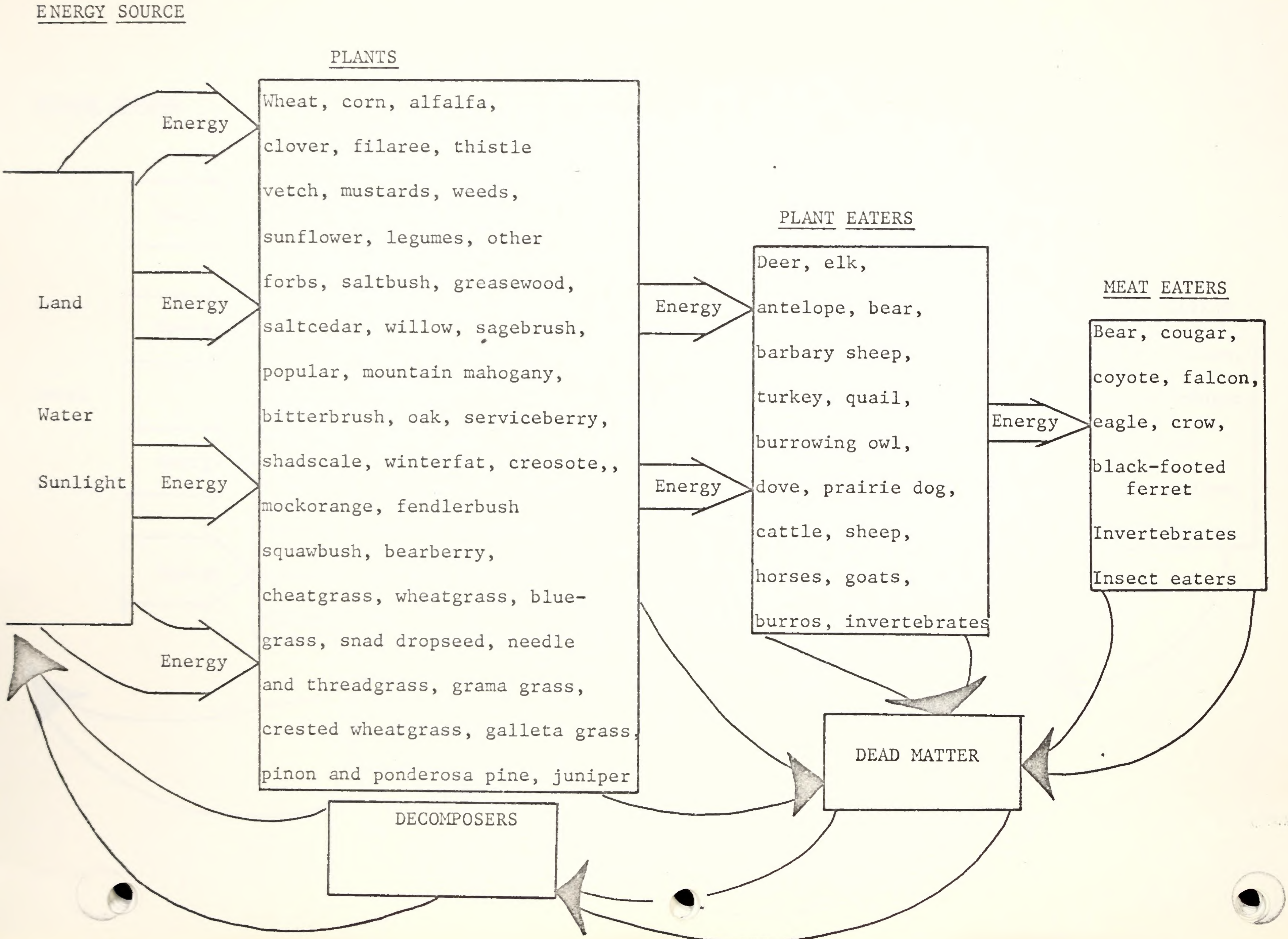
Wildlife species needing special management attention are listed as, unique, rare, endangered, status undertermined on the wildlife species list in the Albuquerque District Office. A more complete list of all mammals, birds, reptiles, amphibians, invertebrates and fish, can also be obtained in the Albuquerque District Office.

C. Ecological Interrelationships

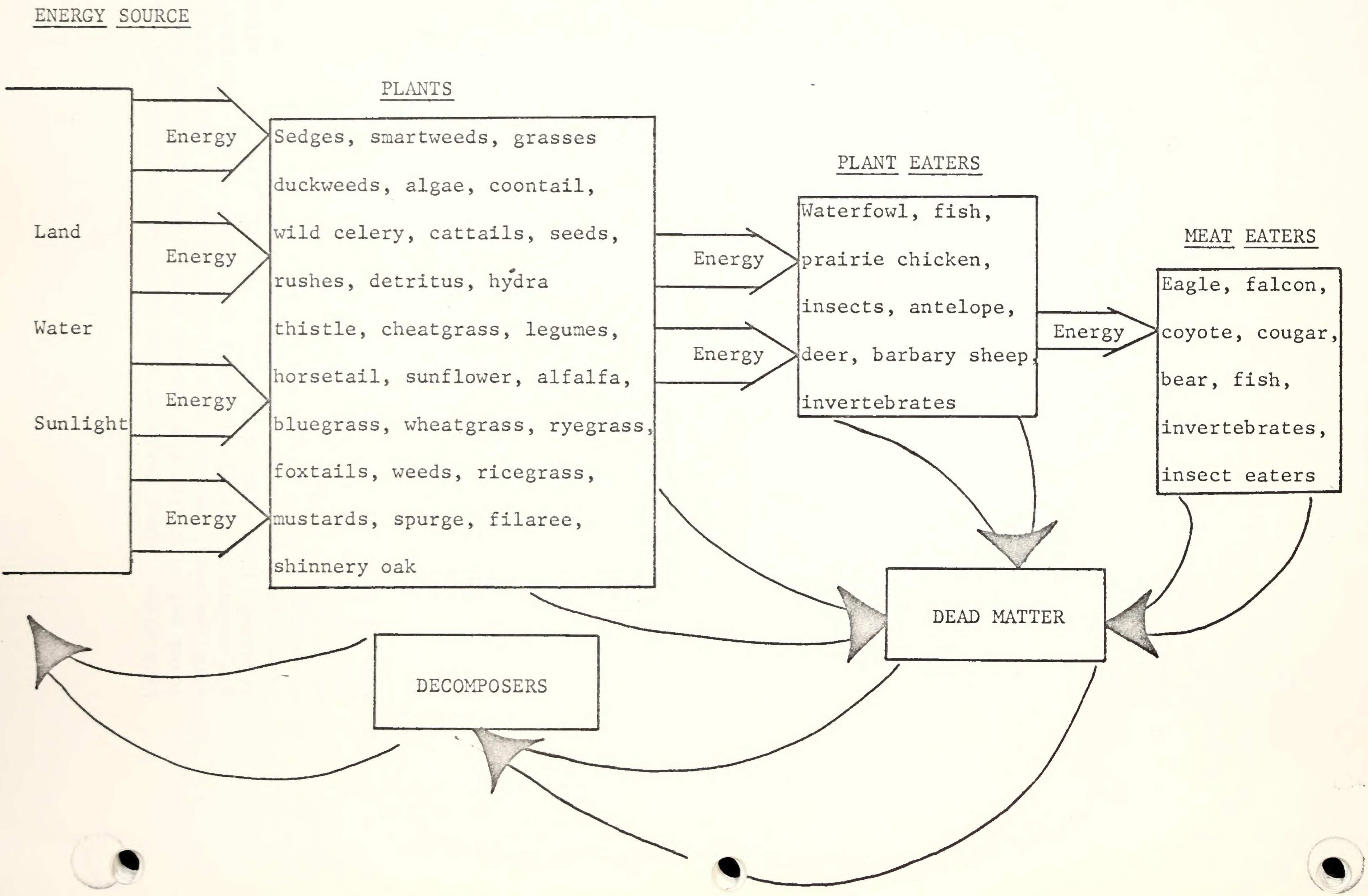
The ecosystems of the subject area are very complex. The most diverse populations of wildlife and the most complex interrelationships thrive within the aquatic areas.

There are four basic energy levels: nutrient sources, producers, consumers and decomposers within the subject area. To simplify these levels, the following were used: nutrient source, plants, plant eaters and meat eaters and decomposers (pages 28 and 29). Energy is transferred from one level to the next by the plants using water, minerals and sunlight to grow; by animals eating the plants; and by animals eating animals. The amount of energy transferred decreases from one level to the next as each level uses energy for growth and respiration. The energy used is not transferred but lost to the next level. Plants, insects, animals and birds all return to the energy source through the decomposers. All energy levels will return waste and dead organic matter to the land. Decomposers (bugs, worms and larve) breakdown the dead matter into simple substances. This is then returned to the energy source and available for reuse.

TERRESTRIAL - ECOLOGICAL INTERRELATIONSHIPS
CHART 1


ENERGY SOURCE
Land
Water
Sunlight
Energy
Energy
Energy
Energy
PLANTS
Wheat, corn, alfalfa, clover, filaree, thistle vetch, mustards, weeds, sunflower, legumes, other forbs, saltbush, greasewood, saltcedar, willow, sagebrush, popular, mountain mahogany, bitterbrush, oak, serviceberry, shadscale, winterfat, creosote,, mockorange, fendlerbush squawbush, bearberry, cheatgrass, wheatgrass, bluegrass, snad dropseed, needle and threadgrass, grama grass, crested wheatgrass, galleta grass, pinon and ponderosa pine, juniper
Energy
Energy
PLANT EATERS
Deer, elk, antelope, bear, barbary sheep, turkey, quail, burrowing owl, dove, prairie dog, cattle, sheep, horses, goats, burros, invertebrates
Energy
MEAT EATERS
Bear, cougar, coyote, falcon, eagle, crow, black-footed ferret
Invertebrates
Insect eaters
DEAD MATTER
DECOMPOSERS

AQUATIC - ECOLOGICAL INTERRELATIONSHIPS
CHART 2



Each plant, plant eater or meat eater is dependent upon the energy level before it for the special food, water and cover required by each species. Removal of any component as an energy level decreases the amount of energy available to the next level. In each energy transfer, from plant to herbivore to carnivore, some energy is lost. No energy transfer is ever 100 percent efficient and the transfer of energy in living systems usually falls far short of a high level of efficiency. Therefore, the quantity of green plant material that is produced is much larger than a quantity of herbivorous animals that feed upon it.

As a result, a population may diminish through a decrease of food supply. The ecosystem can be radically altered by removal of a component (vegetation or rock ledges). The affected area becomes uninhabitable to existing species so other plants, animals, etc. move into the area to replace them. Sometimes the replacement population is desirable or undesirable depending upon the value placed upon the existing situation.

Water moves through an ecosystem in a different way from minerals. This movement of water from the ocean to the atmosphere to land and back to the ocean, is known as the hydrologic cycle. Water which reaches the soil may pass on through and leave the ecosystem by way of springs, streams or underground channels.

The water that remains in the soil is taken up by plant roots. The water that is in the plants is used by animals but they may also receive it directly from raindrops, pools or streams. Eventually most of the water tied up in plant or animal tissues, is returned to the soil to evaporate to the atmosphere directly or perhaps join the flow through streams to the ocean from which it again evaporates into the air. Any surface disturbance effects the hydrologic cycle (Attachment #1). Runoff from these areas will cause eroded material to run into the lakes and the streams. Hydrocarbons from the gas and oil wells could eventually reach the waters which provide habitat for fish and drinking water for animals. Gasses emitted from gas and oil operations into the atmosphere may eventually be carried through the hydrologic cycle. Thus, there is a constant flow of energy, water, and chemicals through the ecosystem. As long as input balances, the output of the system remains stable. If losses come to exceed the input, as so often occurs when man interfers with the natural scene, then the system breaks down; the community is replaced by one of a different kind; or in severe cases is completely destroyed.

D. Human Values

There is evidence that man has existed in this area several thousand years. Distinctive artifacts and architectural remains demonstrate the use of the area by a succession of adaptations to the land resources. This was in response to changing environmental conditions and economic opportunities. The earliest occupation was based on a hunting tradition utilizing the now extinct large herd animals. Following a major environmental change which included the extinction of the large herd animals, man turned to a more generalized economy of hunting and gathering plant foods. This period was followed by the adoption of agriculture and the development of the distinctive sedentary "Pueblo" culture characteristic of several contemporary Indian communities.

Other Indian groups, the Navajo and Apache with a past orientation towards nomadism, are also prominent in the area. These groups, particularly the Navajo, developed a successful and unique way of life based on pastoralism with the introduction of sheep and cattle into the subject area by Spanish settlers.

Both the early Spanish and Anglo-American communities reflect a frontier life of farming and ranching. Several areas also showed short lived prosperity based on mineral wealth.

The contemporary scene includes the descendants of these various historic groups, each demonstrating the distinctiveness of their heritages and differences of language, dress, religion, and other social customs.

The climate of the region has helped to preserve much of the material culture of the groups discussed and the area is considered highly significant to both the archeological and ethnological scientific communities because of its long history and diversity.

This concern with the cultural values of the region is also expressed by the local public. This is evident by several active archeological and historical societies and frequent cultural and craft fairs sponsored by the different cultural communities.

Recreationists from out of state as well as residents are attracted to this area by the archeological, historical, and cultural value of various Indian and Spanish groups. There are various religious activities and festivities practiced by the Indian and Spanish communities which are of interest to many people. Spanish and Indian arts, jewelry, and handicrafts are made and sold throughout the area. This tourism trade provides a substantial revenue to the local economy.

The subject area is a blend of open space opportunities for both land and water oriented activities. Water sports are provided on Elephant Butte, Conchas, Ute, Bluewater, El Vado, and other reservoirs and the Rio Grande and Red Rivers. Outdoor recreation activities are very popular with both local residents and enthusiasts from other parts of the state. Out of state recreationists are growing in numbers. They are principally interested in sightseeing, visitation to state and national parks and monuments, Indian Pueblos, and hunting and fishing. Off-road vehicle use is a sport which is rapidly growing in popularity. Outdoor recreation as a whole is a vital part of the lives of residents and is expected to grow in terms of both economic and sociological importance.

Although the area is dominated by natural open space values, such as mountains, plains, canyons and mesas, it also has numerous human related features in the form of ranch buildings, fences, watering facilities, working corrals, powerlines, pipelines, mines, oil producing facilities, recreation developments, roads and many other such developments.

III. ANALYSIS OF THE PROPOSED ACTION AND ALTERNATIVES

A. Environmental Impacts

1. Anticipated Impacts

a. Non-Living Components

The impact of the proposed action on air quality will come principally from the emission of particular hydrocarbons - ozone, and aldahydes into the atmosphere. There are aromatic odors from such emissions, air pollution caused by blow outs from production equipment and volatile fractions from oil spills contribute to air pollution, as well as burning of oil and other wastes that are cast into pits. The occasional burning of oil or trash may seem to be insignificant, however, the accumulative affects of numerous burning incidents could become a major problem. These problems are nonexistent, however, they could occur if there are any future discoveries in the report area.

Soil exposure due to pipeline installation, seismograph, and other exploration activity, service roads and drilling pads will serve to increase dust in the air, expecially during the windy spring months. Vehicle traffic on surface roads will add to this. Dust results when the natural gas is used in drilling operations. Internal combustion engines used in drilling, servicing, and pipeline construction will

contribute to air contaminates as would the burning of waste oil.

The magnitude of the short-term impact on local air quality is noticeable when concentrated activity such as during drilling or pipeline construction occurs. During the production phase the total impact is only slight.

Any oil or gas leasing or associated activity could conflict with recreation, wildlife, livestock or watershed uses and other resources. The affect that future geophysical prospecting would have on national resource lands would be minimal and temporary. The greatest impact on surface and surface resources is done by vehicles and people traversing the terrain.

Exploration activities (principally seismograph) can cause damage due to vegetative removal (blading) and soil compaction (vehicles). These operations sometime require line blading, site preparation, underground explosions, and off-road vehicle use. If exploration is conducted when soil is wet, erosion occurs within the ruts created by vehicular traffic. Wind erosion on damaged or balded areas can also be a significant impact (Attachment #1).

Impacts from oil and gas activity (surface roads, drill pads, pipelines and tanks) occur when vegetation has been removed from the soil. Wind and water erosion will increase in varying degrees. Drill pads are sometimes constructed on unlevel ground, consequently, a fill is needed to level the pad or keep sediments from entering drainages. The fill banks are steep; and if they are left "as is" erosion is excelerated on the loose soil. When vegetation is removed overland water flow increases which loosens soil particles and transports them downgrade. Subsequently, root systems are destroyed which permits increased mobility of soil particles below the surface. Contamination of soils as well as vegetation may occur due to oil spills, breaching of reserve pits and other improper waste disposal.

Roads that are improperly constructed, excessive in quantity, poorly maintained, and abandoned usually cause various impacts. They increase the potential for serious erosion especially adjacent to river areas on steeper slopes, and/or soils of low infiltration rate.

In remote areas, available water may be a problem for oil seismograph drilling and in oil well drilling which may, in certain areas, deplete a scarse resource. Flooding of underground structures to achieve maximum recovery of oil, uses very large amounts of water which may be needed by agriculture and municipality. However, oil and gas drilling operations may be only minimal in the subject area resulting in a low use of water.

In the event that oil and gas activity increases, surface water sources could be contaminated by improper drilling techniques. The contaminates would be drilling fluid, brackish water, oil and/or gas. This contamination is usually caused by careless operation or be accident. Contamination of surface and underground water is possible when the following occur: accidental spills, improper construction of waste pits, improper waste disposal, breaching of reserve pits following drilling operations, and improper protection of aquifers during exploration and drilling activities.

Surface waters (rivers, small streams, reservoirs, ponds, springs, etc.) are highly localized and important to the ranching industry, recreation and to the many wildlife species that inhabit the subject area. The values of surface and subsurface waters to ranching, recreation, and wildlife will decrease proportionately if the degree or amount of contamination increases. Contamination of surface water could occur when vegetation is removed from drill sites, tank farms, access and service roads, and pipelines through the action of wind and water on the soil. As explained before, eroded soil particles often wind up in natural drainages with resultant downstream siltation and increased water turbidity.

b. Living Components

(1) Plants

Impacts on vegetation (Attachment #2) from oil and gas activities can be both indirect (contamination of surface and subsurface waters) and direct (blooie lines, breaching of mud pits, etc.). The undisturbed riparian vegetation that grows in and near water provides a fairly stable lower watershed condition, provides necessary food, cover, shelter, and nest sites for wildlife and provides aesthetic appeal for various recreation activities. Obviously, the

loss of plant life within the riparian vegetative type could have undesirable impacts, both temporary and permanent, on various resources. Seismograph exploration vehicles may impose a temporary stress and partial removal on plants through travel over ground, storage of equipment and other uses. Complete destruction of plants occurs on areas that are cleared for access, service roads, pipelines, rights-of-way, tank battery locations, and drill pad sites.

Other impacts may occur over time on unprotected soil through the increased activity of wind and water erosion. Road construction can have a favorable impact (productivity and use of other resources) providing that erosion control techniques are used. Impacts are only short-term if the road is temporary in nature.

There are two vegetative types that are less vulnerable to surface disturbance. Grassland type which occur on flatter slopes and usually have better ground cover with less water runoff. These soils are more stable and are less subject to erosion and respond better to revegetation efforts. The creosote bush vegetative type is reportedly very resistent to destruction. However, other kinds of vegetation in this type are easily destroyed due to poor soils. These frail lands within the creosote type would be highly vulnerable to erosion and vegetation very difficult to re-establish.

Pads, pipelines and rights-of-way have significant impacts, if the route or pad is located in timbered areas and it will take some acreage out of production. New roads may benefit logging by providing ready access to a previously isolated area. There may be additional fire hazards due to possible leaks.

Any grass seeding that is done in timbered areas should be only those species which will not spread into the timbered areas and cause unnecessary competition with reproduction of native trees.

In general, the various impacts could occur within any vegetative type discussed. Temporary impacts would be greater in any vegetative type that is located near water.

(2) Animals

Crucial land surface could be removed or destroyed through various associated oil and gas activities. Disturbance

of soil and vegetation would reduce the quality and amount of food cover, shelter, and available nest sites. The impacts of surface disturbance near water areas would be greater as a larger variety of wildlife inhabit these water zones. The quality and quantity of habitat would be reduced thereby reducing the suitability of an area for some wildlife species.

A decrease in quantity and quality of these water areas (marshes, ponds, lakes, banks, canals, streams, rivers) used for cover, nesting, seeding, wading, and resting could result if vegetation was removed, if effluent was discharged or leaked into these areas, and if pads, roads, and pipelines where built through them. When the quantity of native riparian habitat is reduced, the value of these more mesic sites (marshes, ponds, banks, beaches, mud flats, sandbars, tules, and dried up stream beds which are used by all types of waterfowl, song birds, and small mammals) will diminish. Likewise, the riparian vegetation adjacent to water (holes, seeps, springs, ponds) is important to birds for brood rearing and nesting areas and to some mammals. Removal of vegetation and soil within these areas reduce the quality of habitat for wildlife and quantity of forage for livestock.

Removal of vegetation on river, stream, lake banks or adjacent slopes or canyon walls, will undoubtedly increase bank sluffing, water turbidity, sedimentation (suffocating food or bottom living organisms and silting in deep pools, gravel and sand deposits - spawning beds), water temperature. The suitability of the aquatic habitat is thus lowered for all aquatic organisms such as fish. Disturbance of vegetation will decrease the amount of habitat (food and cover) available and the quality of habitat for wildlife species. When disturbance becomes too great and the habitat too limited, wildlife populations will shift use areas, migration routes, and move out.

There are several hazards on drill pads that could be detrimental to wildlife and other mammals. Open pits (especially those that contain toxic and oily substances) are hazardous if a bird or animal comes in contact with the substances. Effluent (oil, grease, and toxic substances) can render a site unproductive, hinder bird movement, decrease the available habitat, and can cause death of birds or animals through internal or external contact. Death related impacts will not be known until the chemical analysis of substances from various evaporation pits has been made.

Ecological systems may be changed or impaired through the disturbance of soil and vegetation. Other plants and animals, birds, etc., living outside the existing ecological community which are more suited to the new or disturbed site conditions will move into the area. The plant and animal community thus created may or may not be desirable for management. Safe guarding certain site characteristics can do much for reducing the impacts to important wildlife areas. The removal of snags and tall trees (cottonwoods, populars, pine) within mesic and xeric areas will reduce the number of roost and nest sites available to turkey, eagles, hawks, herons, owls, etc. Reduction of the understory vegetation would alter the available forage produced for grazing animals or birds. Subsequently, a reduction in the various food sources such as fish, mammals, and birds would occur. The distruction of cliff faces, mesa rims, and rock outcrops that provide potholes, ledges, and overhangs, limits the available nesting habitat for endangered species (peregrine falcon) as well as other hawks, owls, eagles, etc. Unusual or new disturbance above and beneath the cliff face or nesting site will discourage nesting activity of the more sensitive birds (falcons). Generally, the impact of a disturbance near a nest site varies with the size and amount of the disturbance. Impacts on nesting activities also increases as the distance between the new disturbance and the nest site is lessened.

c. Ecological Interrelationships

Habitat or range used by livestock or wild mammals, birds, reptiles, etc., could be destroyed or limited depending upon the extent of the disturbance. No one animal, bird, fish or insect is affected when a given site is disturbed (discussed in Existing Environment section). When any part is removed from the system (an insect or plant or animal) energy that is contained in that organism or plant is lost (pages 29 and 30). When sites are disturbed or changed, some wildlife species move out, others come in, and some remain due to their ability to adapt to the new conditions. If the site change is radical enough, the site becomes more or less sterile. Surface disturbances can set back natural process of succession, emigration, and immigration many thousands of years. The impact upon wildlife and fish habitat and livestock range in any given area can be severely detrimental or beneficial (depending upon the degree of disturbance) for some species and their habitat/range needs (Attachment #14).

d. Human Values

Seismograph and development crews sometimes cut through valuable archeological sites. Excavation for camp sites, drill pads, pipelines, etc., can result in the same damage. Unknown sites are sometimes uncovered. If discovery is made before serious damage has been done, it can render much valuable scientific information. The subject area, however, is believed to continue to have considerable amounts of unidentified archeological sites. Many of these have been located and others are thought to exist from the Augustine Plains in the south through the Raton area in the north. Oil and gas activities will probably increase in the future, subsequently, access will be improved. Archeological sites otherwise protected will be found and damaged by persons looking for ancient relics. If exploration activities take place over large areas, the effect upon the visual environment will be adverse. As a result of surface activity, permanent scars are likely to result due to the slow recovery rate of vegetation in the subject area. Wild fires, blowouts, oil spills and leaks, access roads and drill pads will have similar impacts. The degree of the visual impact created during the development stage depends upon the extent of discovery and the size of the oil producing structures that are found. Oil and gas production has significant environmental impacts where required standard production facilities and equipment such as well head separators, storage tanks compressors, pipelines, electrical transmission lines, and access roads are located. Wherever there is a construction operation, debris often accumulates. Junk, litter, abandoned equipment and parts of equipment may be scattered over any surface where there are oil and gas activities.

Noise and vibrations from stationary engines used in drilling operations and production operations and in pipeline compressor stations, disturbs the natural environment. This kind of impact exists only for the time the engines and other machinery are in operation. These are not considered serious problems because the area is large and has a low population density.

Oil and gas production facilities will leave roads, drill pads, and other facilities open to increased erosion and degradation and cause some hazards to human and animal population. Some natural revegetation can be expected, but it could be many years before perennial vegetation would re-establish itself on these sites in their former density and compositions unless proper rehabilitation is conducted. This is serious in the sense that many areas present a mood atmosphere and are associated with vast open spaces which are sparsely populated. Oil and

gas activity could change much of this atmosphere if producing zones were discovered and developed.

The area is rich in geologic beauty which includes unique sandstone, volcanic, and other rock formations such as mesas, bluffs, and canyon walls. Some of these areas are highly vulnerable to surface damage. Unplanned construction of roads, rights-of-way and drill pads can do extreme damage to an area with high geological value. Structures such as precipitators and surface pipelines which cannot be located in a less visible place, are painted colors (usually silver) which does not blend with the natural beauty of the area.

In addition to adding to the nations energy fuel supply, some of the benefits that would result from oil and gas operations to human population would be: improved recreation and sightseeing opportunities, and improved knowledge of the subsurface geology and hydrology. Some of the roads built by oil and gas activity would open up new areas for rockhounds, bird watchers and sightseers. Many areas that are now inaccessible would be opened to many forms of recreation.

The overall scenic quality will be reduced as a result of the actual roadway intrusion. However, in some areas the impacts to aesthetics, natural beauty, wildlife and watershed would outweigh benefits derived from oil and gas acitivity in the given area. Drill pads, roadways, and other land scar will clearly reduce the scenic value of areas with moderate to high scenic qualities. As additional exploratory roads and test sites are developed, fewer areas of backcountry, and primitive value will remain. This is a serious matter as strong opposition will likely result from conservation forces dedicated to preserving wilderness and/or open space qualities. Hunting for recreation will also be altered and game populations and traditional game sites will change or disperse to the disadvantage of the hunter. Heavy mineral activity will force desirable game species further into inaccessible country to the dismay of both the hunter and wildlife observer. Increased development of much of the subject area will also likely result in opening heretofore many inaccessible, archeologically valuable areas for potential vandalism and pot hunting. Such destruction is a major loss of irreplaceable resources.

e. Alternatives

In the parts of this area already developed, the impact of no leasing would have little effect on the environment but may result in a possible loss of the oil and gas supply. There are

existing leases which could perpetuate surface activity for several years. The impact of this activity is evident by observing the impacts that oil and gas acitivities have had on the environment in existing oil and gas fields outside the subject area (i.e., San Juan Basin). Consequently, the alternative action of no leasing would have no immediate change on cumulative oil and gas impacts in producing areas. It would cause a gradual reduction of surface activity from oil and gas due to expiration of existing leases.

Impacts resulting from other alternative energy sources (other energy sources are discussed in the Description of the Proposed Action and Alternative section) are discussed at length in the following references:

1. Final environmental statement FEF 73-19 (Proposed 1973 outter continental shelf east Texas General Oil and Gas Lease Sale.

2. Programmatic environmental statement, for coal.

3. Other alternative energy documents (currently being prepared by the department).

2. Possible Mitigating or Enhancing Measures

The possible subsequent recommended mitigating measures can be implemented in any of the following places:

1. When notice of intent to conduct oil and gas exploration operations is received (Form 3107-1).

2. Leases: Noncompetative offered to lease and lease for oil and gas (Form 3120-3), noncompetative acquired land lease - offer to lease and lease for oil and gas (Form 3110-3), simultaneous oil and gas drawing entry card (Form 3112-1).

3. When application for a permit to drill is received by BLM from USGS or the lessee (9-331).

4. When notice of abandonment is received by USGS and BLM is subsequently contacted for recommendations (9-331).

5. When rights-of-way such as pipelines, and powerlines are considered.

a. Non-Living Components

The negative factors affecting air can be minimized. Some of these measures are as follows: vegetal clearing and surface disturbance should be limited during geophysical prospecting as specified under mitigation of soil erosion. Where roads are necessary during prospecting and exploration, they should be constructed only to the extent necessary to provide proper access. Roads that are constructed adjacent to riparian areas should be pre-located by BLM to minimize all related impacts. Most roads permitted in conjunction with prospecting and exploration should be closed immediately after their intended use is fulfilled. Permanent access roads should be surfaced with gravel or comparable materials to minimize dust pollution. Whenever possible, this surface material should be taken from already disturbed areas. After development and the well goes into production, rehabilitation measures should be implemented on all areas which will not be used for production. This will include road maintenance, portions of the drill pad, etc. After any field is abandoned, intensive rehabilitation work should be performed on all roads and other disturbed areas which are to be abandoned.

Burning of hydrocarbons and the release of gaseous products into the atmosphere should be permitted only as specified by state regulations (Section 301F on Air Quality Control). Air pollution resulting from accidental fire spills and leaks may be partially prevented by routine safety procedures and inspection. Hydrocarbon pollution of air could be reduced by disposing of waste by methods other than burning. These methods could include burying in a sanitary landfill, field reinjection or hauling elsewhere. Dust in the air could be mitigated by requiring revegetation of the denuded areas, holding access and service roads to a minimum, reducing the size of drill pads and tank battery sights and by not allowing use of natural gas in drilling. Rehabilitation of roads that were built in conjunction with prospecting and exploration can also help minimize dust.

The most obvious measure to mitigate impacts of oil and gas exploration, development and production on land would be to reduce the total miles of roads, minimize the width and length of pipeline rights-of-way, and minimize the size of drilling pads and tank farm sights. Erosion control must be a foremost consideration in the location of oil and gas well sites and facilities related to oil and gas production so as to minimize soil movement from the disturbed site to adjacent native stands of vegetation. Such impacts upon soil erosion can be reduced by careful pre-planning guided by suitable stipulations. These stipulations would provide for reducing the area of impact to

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should be protected
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[illegible]

a minimum and rehabilitation of disturbed areas by seeding or construction of water control structures as applicable (maximum grade, slope, waterbar locations, and drainage control). More stipulations should be applied to applications for drilling in areas of high erosion hazard potential (Attachment #1).

Revegetation can be aided through stockpiling and returning of top soil when drill pads are constructed. All waste pits should be filled and leveled after abandonment and the top soil replaced if applicable. The use of protective or secondary dikes around sludge pits and the drill site will afford protection against overflow and leaks which escape into rivers or reservoirs from the primary pit which receives fluid discharged during jetting operations.

BLM and USGS representives should examine the drilling sites prior to commencement of operations. This provides control over improperly constructed roads by an on the ground examination of the plan of operation. Location of roads can be specified at this time to limit the impact. Additional investigation can provide protection through the use of road surfacing, waterbars and other drainage structures.

More strict design specifications may be required on certain frail lands. These are break areas adjacent to the Rio Grande between San Acacia and Bosque Del Apache where the soil is unstable and the slope is moderate to steep. If activity is allowed in these areas, immediate revegetation will be required. Strict control to prevent pollution from drilling mud, waste oil, oil spills and well blowouts other than the aforementioned could be partially mitigated through more compliance checks by both USGS and BLM. Closed drilling may be required in certain drainage areas in close proximity to major rivers and streams.

Minimizing of any surface disturbances during all phases of oil and gas activity will result in the reduction of siltation and turbidity in surface waters. The location of drilling sites away from drainages, surface water and riparian areas can reduce the danger of water contamination from accidental spills and leaks. Poor construction of waste pits could result in leakage of corrosive fluid into the ground water aquifers as well as surface waters. If water is produced with hydrocarbons from wells near a riparian area, it should be disposed of in a non-pollutant manner. Waste pits must be well constructed to prevent leaks and washouts so as not to pollute any water sources. A stepped up program of inspection could reduce oil spill accidents, reserve pit breaching, and waste disposal.

Any of these could affect ground and surface waters when various waste materials are not disposed of properly.

Ground waters should also be protected. Proper well casing procedures (i.e., as specified by USGS and New Mexico state laws) can reduce loss of ground water from the shallower aquifers which would protect surface water. Immediate reinjection of production water during secondary recovery efforts (water injection) can mitigate surface water lost by maintaining the water table. Prior to the removal of well casings from abandoned wells, the district manager should decide if the well is needed for fresh water sources. Stipulations in the lease allows BLM to acquire the well if there is a need for the water.

b. Living Components

(1) Plants

The possible mitigating measures for lands used in roads, pipelines, drill pads, etc. would also reduce the number and variety of plants destroyed. Plants are subjected to site condition stress in an area of approximately 10 to 20 acres where cuttings from gas drilling is blown out. This process could be stopped. Revegetation of denuded soil as soon as possible is the the most important of the possible mitigating measures.

(2) Animals

The mitigation of impacts for animals in a sagebrush, cresote, pinon-juniper and grassland types do not differ significatnly. Therefore, the mitigating measures are general. The protection of areas that are critical for the survival of some wildlife species will be maximized. Oil and gas acitivity adjacent to the rims of major river canyons, lakes, reserviors, small streams, marshes, tules and slopes, draws, rocky hillsides (that have a brushy understory) may not be allowed. The discharge or leakage of effluent into riparian areas (marshes, ponds, lakes, reserviors, streams, rivers, canals, etc.) should be prevented by the various means already discussed. Some well dehydrator or evaporator pits may have to be covered or protected by other means to protect wildlife. A chemical analysis should be made in the subject area to determine the composition of effluent in dehydrator or evaporator pits. Should these analyses indicate whether toxic or harmful substances are present, protective devices may be required on a case to case basis.

Surface disturbance could remove key forage species that are important to survival/maintenance of wildlife/livestock. Therefore, the removal of browse and grass understory should be permitted only when absolutely necessary. The removal of the tree overstory when clearing a pad for drilling operations will be permitted, but kept to a minimum. Any possible seed trees near the cleared pads, pipelines, etc. should be left undisturbed. These disturbed areas will be reseeded with a mixture of the key forage species as determined by the BLM representative. To discourage surface disturbance in areas where vegetation is difficult to establish, reseeding disturbed sites will be required until the seeding is successful.

Powerline electrocutions of large raptors such as eagles, red-tailed hawks, and other large hawks, in general, are limited to localized areas where these birds hunt and nest. On any given system it appears that remedial modification of frequently used power poles will greatly reduce the incidents of electrocution. The illustrations and text of the REA Bulletin 61-10 (Attachment #13) identify those details of standard construction that seem to contribute to eagle electrocution; and offer suggestions for relatively inexpensive modifications which will make the various structures less hazardous to large birds. Only the most commonly used structures are discussed. An understanding of how these structures can cause electrocution and how they may be modified will encourage use of structures that would protect eagles, etc.

Abandoned power poles can be a benefit to large raptors and perching birds. When future rights-of-way are abandoned the lines should be disassembled. When any part or all of the existing rights-of-way are abandoned, BLM representative should be consulted. The lessee may be asked to leave some of the power poles where perches of this kind are limited.

c. Ecological Interrelationships

Sufficient mitigation in a subject area should be realized if the mitigation measures suggested are incorporated into the lease or the drilling permit.

d. Human Values

Protection will be difficult for archeological values because most of the area has not been substantially inventoried for

these values. However, due to the known archeological values in the area restricting oil and gas leasings in some areas should be considered. There are two alternatives to protect archeological values; first, avoid disturbance and second salvage excavation before approving plans of operation. The proposed area of operation should be inventoried for archeological values. When a site is discovered during construction, the operator should notify the USGS immediately and avoid further disturbance. If the lessee could not use an alternate route and excavation is necessary and allowed by BLM, it shall be financed by the lessee. Noise and odor problems associated with the production phase should be controlled.

There are a number of mitigating measures which can be taken to mitigate the visual impacts. Items to be considered for mitigation of visual impacts would be: (1) to use the minimum size drill pad necessary to get the job done, (2) to build adequate retaining dikes around all mud and evaporator pits, (3) to locate the drill pads in areas which are as inconspicuous as possible and (4) to locate the drill pads in areas where clearing would cause minimum damage. Power lines and other structures could be hidden from heavily traveled roads below skylines which are in view by large numbers of people in areas where there is already some type of surface disturbance. Proper design and location of facilities will eliminate the maze of roads, seismic lines, pipelines, and power lines and decrease the visual impact. The existing standard basic requirements are one of the major problems in reducing visual impacts.

If the spacing regulations were more flexible for locating well sites unnecessary damage could be eliminated. Immediate planting of vegetation on all exposed soil on cut and fill slopes would help reduce the impact while the field was in production. The use of a more harmonious color scheme for the surface structures would make the facilities less obvious from a distance. Most of the few existing surface structures are now painted either silver or black. Neither of these colors appear in natural landscape.

When the area is abandoned, most of the visual impacts could be eliminated. These areas can be restored by removing all surface structures and by rehabilitating well pads, roads and other improvements.

e. Alternatives

In some parts of the subject area, the alternative of no leasing cannot be mitigated due to the tenure of existing leases. How-

ever, the alternative of no action may be considered as a mitigating measure in areas where there is no leasing or oil and gas activity.

3. Recommendations for Mitigation or Enhancement - (Stipulations)

The respective District Manager may add surface protection and other environmental stipulations to the various leases, permits, and rights-of-way issued. The following stipulations have been developed and will be selected specifically as they apply to the individual action being processed.

Note that there are general recommendations for the entire area and recommendations for specific areas. Most areas are suitable for leasing, however, within some leases there may be areas which will need to be segregated from surface activity.

Stipulations and Guidelines

1. The general surface disturbance stipulations for oil and gas leases, (Attachment #11) will be attached to all leases.

2. Prior to any surface disturbance it will be necessary for the lessee to obtain archeological clearance for the area involved.

3. Roads crossing fences will have gates and/or cattleguards constructed to BLM specifications.

4. Any pipelines will be constructed within the area cleared for the access road when possible. The road should not exceed 20 feet in width. Clearing will not be done except where absolutely necessary for laying the line. Certain spots such as blind curves and hill tops may need to be wider for safety reasons.

5. Construction of roads including culverts, turnouts, ditches or waterbars (thank-u-mams) will be done according to BLM specifications (Manual 9110-9115.68). (See Attachment #12).

    a. The maximum slope distance between waterbars (thank-u-mams) will be:

        (1) For grades of 1% or less, the slope distance is 400 feet.

(2) For grades of 1% - 5% the slope distance is 300 feet.

(3) For grades of 5% - 15% the slope distance is 200 feet.

(4) For grades of 15% - 25% the slope distance is 100 feet.

(5) For grades greater than 25% the slope distance is 50 feet.

b. Further stipulations for thank-u-mams will be:

(1) All structures will extend a minimum of 10 feet on each side of the right-of-way or road.

(2) The spillway end of the structure will be disturbed as little as possible so as not to damage the surface in this area.

(3) All flow channels will be unobstructed for the full width of the structure.

(4) The structures will cross the right-of-way at an angle of approximately 75 percent from the right-of-way center line.

(5) Structures will be constructed across the full width of access roads in the right-of-way where land is cleared of vegetation where the soil is disturbed as a result of the lessee's operation.

6. Abandoned or unneeded roads will be closed off, reshaped and reseeded as determined by the authorized BLM official.

7. All activities shall be confined to the access road and drill pad. Activities outside these areas must be approved in writing by the BLM.

8. All access routes, roads and rights-of-way shall be located so as not to detract from aesthetic values (i.e., up mountain slopes along well traveled highways, etc).

9. Roads will be located in pipeline or other utility or transportation corridors wherever possible.

(10) Any existing improvements affected by any oil and gas activity shall be maintained in a serviceable condition at all times. In the event any such improvements owned by the United States or its permittees or lesses are destroyed, immediate replacement or reimbursement for its full value will be made as determined by the responsible BLM representative.

(11) Upon completion of construction of the drill pad, a sign no less than 3 feet square shall be posted on the pad warning of the dangers of entering the site. This sign shall remain until all hazards are removed or remedied.

(12) Pads shall not be located in or adjacent to major drainage bottoms, lakes or perennial streams no closer than 300 feet without special approval of BLM. (In certain areas metal tanks may be necessary to hold all drilling mud which will be properly disposed of in an area designated by BLM).

(13) Where excavation will be extreme or where bedrock will be encountered, existing topsoil shall be replaced. The determination will be made at the site during the field investigation as to which site shall have topsoil stockpiled. Stockpiled topsoil (if any) shall be evenly distributed over the entire disturbed area before reseeding takes place.

(14) When gas is used in the drilling process, the line used to discharge and burn off the gas will be located so as not to damage vegetation in the area. If this is not possible, an earthen baffel will be constructed to keep the heat and residue within the operating area.

(15) The reserve pits shall be well constructed and under no circumstances will they be allowed to leak or be cut to drain. They shall not be located on natural drainages. All waste associated with the drilling operation will be buried in place or removed and deposited on an approved sanitary land fill. Waste or discharge of any kind will not be allowed to enter any drainage.

(16) The reserve pits will be covered immediately if they can be covered without disturbing any additional surface. Otherwise, the reserve pits will be fenced and the liquid portion will be allowed to evaporate before the pits are covered.

(17) Portable chemical toilets will be provided on all drill sites. All garbage (metal containers will be crushed) and sewage will be disposed of inaccordance with state health standards.

(18) New Mexico State Regulations for air quality must be complied with in disposal of hydrocarbons.

(19) All liquid hydrocarbons and chemicals shall be contained in evaporator pits. Any hydrocarbon or waste chemicals removed from the drill site shall be disposed of at a site approved by the authorized BLM official.

(20) Evaporation pits will be constructed and maintained so that runoff from heavy rains or snow will not cause breaching of the pit.

(21) Pipelines will be backfilled with dirt that is removed from the trench. A berm will be left on the top of the backfilled trench to allow for natural settling.

(22) During the clean-up operation, upon completion of drilling, all cut and fill banks will be sloped to be no steeper than 3:1.

(23) All drill sites, roads and rights-of-way will be rehabilitated. The operator will contact BLM in relation to the plan of rehabilitation of the site for the time of seeding and the seed mixture to be used. This will be done before release from bond by USGS. The authorized BLM official will be advised when the planting has been accomplished. If in the opinion of the authorized officer, the first seeding or planting is unsuccessful, he may require the lessee or grantee to make additional seedings or plantings.

(24) When trees and/or brush are cleared, the woody material is not to be left in piles along the cleared area. It shall be placed in arroyos and walked down for erosion control.

(25) All oil surface pumping equipment shall be fenced to keep animals away and shall be properly posted to warn the public of the hazards.

(26) Any electric distribution lines constructed will conform with appropriate raptor protection stipulations. (REA Bulletin 61-10, See Attachment #13).

(27) When any pole lines are abandoned, a designated number of poles will remain in place as determined by the authorized BLM official.

(28) No oil and gas related surface activity will be allowed within approximately 100 yards of riparian areas, ponds, reservoirs, and irrigation ditches.

(29) Any evaporator pit found to contain toxic liquids will be fenced and/or covered and posted as directed.

(30) When critical wildlife habitat exists, no oil and gas related surface activity will be allowed within approximately 100 yards of brush covered slopes, within approximately 200 yards of mesa edges and within approximately 100 yards of the edge of grassy parks.

(31) No oil and gas related surface activity will be allowed within approximately 1/4 mile of cliffs, ledges, escarpments, rock outcrops and canyon walls and rims suitable for good bird nesting.

(32) No oil and gas related surface activity will be allowed within approximately 100 yards of any prairie dog towns.

(33) All oil and gas related surface activity will be excluded from approximately 200 yards of brushy arroyos and draws within antelope key areas.

(34) All oil and gas related surface activity will be excluded from approximately 100 yards of ponderosa pine stands and adjacent canyons.

(35) All structures and pipelines above ground shall be painted a color (non glossy paint) to blend with the surrounding area.

(36) Surface disturbing activities will come no closer than 100 feet to archeological mounds and pit houses and 300 feet to standing archeological structures.

(37) No surface activity will be allowed within 300 feet of any proposed primitive area.

(38) All proposed surface disturbing activities will be thoroughly examined by BLM personnel to determine a location which will reduce impact on scenic values.

In some cases these activities may not be allowed. Rehabilitation may include replanting of native vegetation.

(39) Disturbance of isolated riparian sites that have populars, cottonwood, tamarisk, willow, alder and similar riparian vegetation will not be permitted.

(40) ORV travel should be blocked where erosion problems are expected to occur. Some of the possible methods could be large waterbars, fences, piling of trees or rocks, etc. depending on the site.

(41) In timbered areas, pipelines should be buried deep enough so that log skidding or log roads constructed over them will not cause damage to pipelines or cause unnecessary hazards.

(42) Full consideration will be given to runoff water from the pad. Specific slope design will be required for the pad to minimize excelerated erosion. Contours are also required on the pad to reduce erosion.

(43) Upon completion of drilling, a sample of the reserve pit liquids will be taken and analyzed for toxic and harmful substances. A certified analysis will be furnished to USGS as to time, location of sample and accuracy of analysis. If the liquids are determined to be harmful to wildlife or vegetation, BLM may require that the pit be covered or fenced to protect livestock or wildlife. The fence will be built by the lessee and will be designed by the BLM as to the type of wire, height, etc.

(44) All trees and brush cleared from the drill site shall be stockpiled adjacent to the site. The piled vegetation shall be distributed around the pad and adjacent areas (after the disturbed area is reseeded) as directed by the responsible BLM official.

(45) All disturbed areas to within 20 feet on each side of any production structure will be restored.

(46) No roads will be built in conjunction with powerlines, rights-of-way in areas where terrain will allow vehicles to maneuver without the aid of such roads.

(47) If the wells which produce potable water are abandoned, prior to the removal of well casings, the District Manager should decide if the well is needed

for fresh water sources. Ownership of the well can be discussed at this time.

(48) In timbered areas, road location should be "approved" by the district forester to coordinate other possible future uses by the road.

Roads that will probably remain as permanent roads should be a minimum of 14-2 (14' subgrade - 2' ditch). When no ditch is constructed on temporary roads, the road bed should be slightly outsloped.

(49) All trees and snags within 100 yards of the clearing edge will be left standing. All other trees that provide cavities or are being used for nesting or perching shall be left alone. Trees that are adjacent to these nest or perch sites will also be left alone. Tall trees near clearings, on the clearing edges, and adjacent to rims or high points will be left alone.

(50) Pinon-juniper, ponderosa pine, oak, other brush, grass and forbs will not be removed within 1/4 mile of water (springs, reservoirs, tanks, seeps, etc.).

4. Residual Impacts

a. Non-Living Components

No known residual impacts in air quality will result. There are areas as discussed under the impacts section where the impact of certain operations on air quality are unknown. Until such impacts are further identified and mitigating measures are devised, residual impacts are unknown.

Erosion is a major problem associated with oil and gas activities. The mitigating measures are not sufficient to control a major portion of the erosion that would occur. In some cases the watershed will be improved and erosion reduced through application of these measures. The highest degree of impact will occur during the interim period between surface disturbance and the successful application of mitigating measures. These impacts are relatively insignificant but are unavoidable.

Water resources are very valuable in the subject area. Water quality has been previously discussed. No significant residual impacts exist on water unless an oil spill occurs. Then the impact would be locally significant.

b. Living Components

(1) Plants

The removal of plants directly affects the impacts on land in the form of soil erosion. Very seldom during the revegetation process has the exact native species been replaced. Often the replacement species vary for reasons such as superior watershed values, availability, economics, etc. Aesthetics would receive the greatest impact due to the loss of native vegetation through the reclamation of disturbed areas with introduced species. The aforementioned mitigating measures are specific and are designed to mitigate impacts on specific situations. Therefore, the residual impacts may be slight or large as in leaving a noticeable mark on the landscaping.

(2) Animals

If impacts are properly mitigated as discussed within this environmental analysis report the residual impacts to animals would be minimized. However, some residual impacts occur. With each disturbance some species of wildlife will shift their use areas for nesting, for feeding, or hunting. There may also be an influx of new wildlife species into the disturbed area. If surface disturbance (soil removal, vegetation displacement, etc.) is minimized as discussed, the given disturbed area will have little if any residual impact over time.

c. Ecological Interrelationships

By identifying impacts and mitigating measures on various components of the ecological systems there remains no known void within the system which does not have adequate and reasonable mitigating measures. Therefore, there are no significant residual impacts in the interrelationships of the ecology.

d. Human Values

Many of the human values stand to suffer damage due to their irreplaceable nature. These items are or will be identified through inventory or survey before surface activity is allowed. Residual impacts will occur only if mitigating measures recommended in this analysis are not followed.

e. Alternative

The alternative of no leasing would not immediately stop all oil and gas activity and the corresponding impacts. Rather, the activity in any producing area would continue under the auspices of existing leases. Mitigating measures are recommended for drilling and subsequent production activity of which BLM is able to implement through USGS via application to drill. For explanations of procedures see section under procedures. Therefore, residual impacts of future activity under the alternative would be satisfactorily mitigated.

B. Relationship Between Short-Term and Long-Term Productivity

The short-term period of the proposed action is expected to cover several years as previously discussed. This use has impacts, some known and some unknown, which affect the interrelationship process. The impacts on the majority of all resource values are mitigated through measures previously stated. The cumulative revisual impacts are not expected to significantly affect the environment. The effect of the mitigating measures implemented during the short-term are expected to improve the productivity over the long-term.

C. Irreversible and Irretrievable Commitment of Resources

All production of oil and gas is assumed to be an irretrievable commitment of this resource because it is usually consumed relatively soon after it is extracted. Under these circumstances the immediate value of that oil and gas is a resource which is lost. The surface disturbance and facilities associated with oil and gas production are not irreversible commitments of the resource.

At times due to error or negligence, a sight of archeological or historical significance is partially or completely destroyed due to surface activities. Due to the nature of these sights their values are irretrievable once they are destroyed.

The historic mood atmosphere of the area is something that will be altered forever. Oil and gas is something that has never before been produced in part of the area. If nothing more remains as evidence of oil and gas production, it is recorded historically and will stand out as a definite alternation of the mood atmosphere.

IV. INTENSITY OF PUBLIC INTEREST

The district manager contacted over 40 different organizations including city and county governments, other federal and state agencies and various concerned environmental groups. From the group the District received only 7 letters in reply, five governmental agencies, one from oil and gas company and one from environmental organization.

The total public response was much less than the total response generated by the recent San Juan Oil and Gas Environmental Analysis Report. Even that report did not create very much public interest concerning oil and gas leasing and associated activities.

The lack of public concern at the local level may be basically explained by the following:

1. The probability of discovering large oil or gas fields in the subject area as low.

2. Much of the area involving national resource lands is very lightly populated and not visited by the tourist in any significant numbers.

3. Much of the local people would appreciate some of the financial benefits if large oil and gas fields would develop.

V. PARTICIPATING AGENCY STAFF

Kenneth G. Walker, Environmental Specialist, John J. Rhodes, Mining Engineer, George B. Hollis, Wildlife Biologist, Robert Anderson, Realty-Recreation Specialist, Leo Flynn, Archeologist, Richard Neimeyer, Recreation Planner, Ronnie Clark, Watershed Specialist, John Moeller, Land Use Planner, James W. Young, Assistant District Manager, Lloyd Eisenhauer, Area Manager.

VI. RECOMMENDATION ON ENVIRONMENTAL STATEMENT

If the recommendations in this analysis are implemented we conclude that the environment will be adequately protected. This is based on the assumption that the recommended mitigating measures are followed and that the rationale as stated in the residual impacts section is accepted. Therefore, an environmental impact statement is not recommended.

VIII. SIGNATURES

George B. Hollis — 9 July 1974
Date

John B Rhodes — 9 July 74
Date

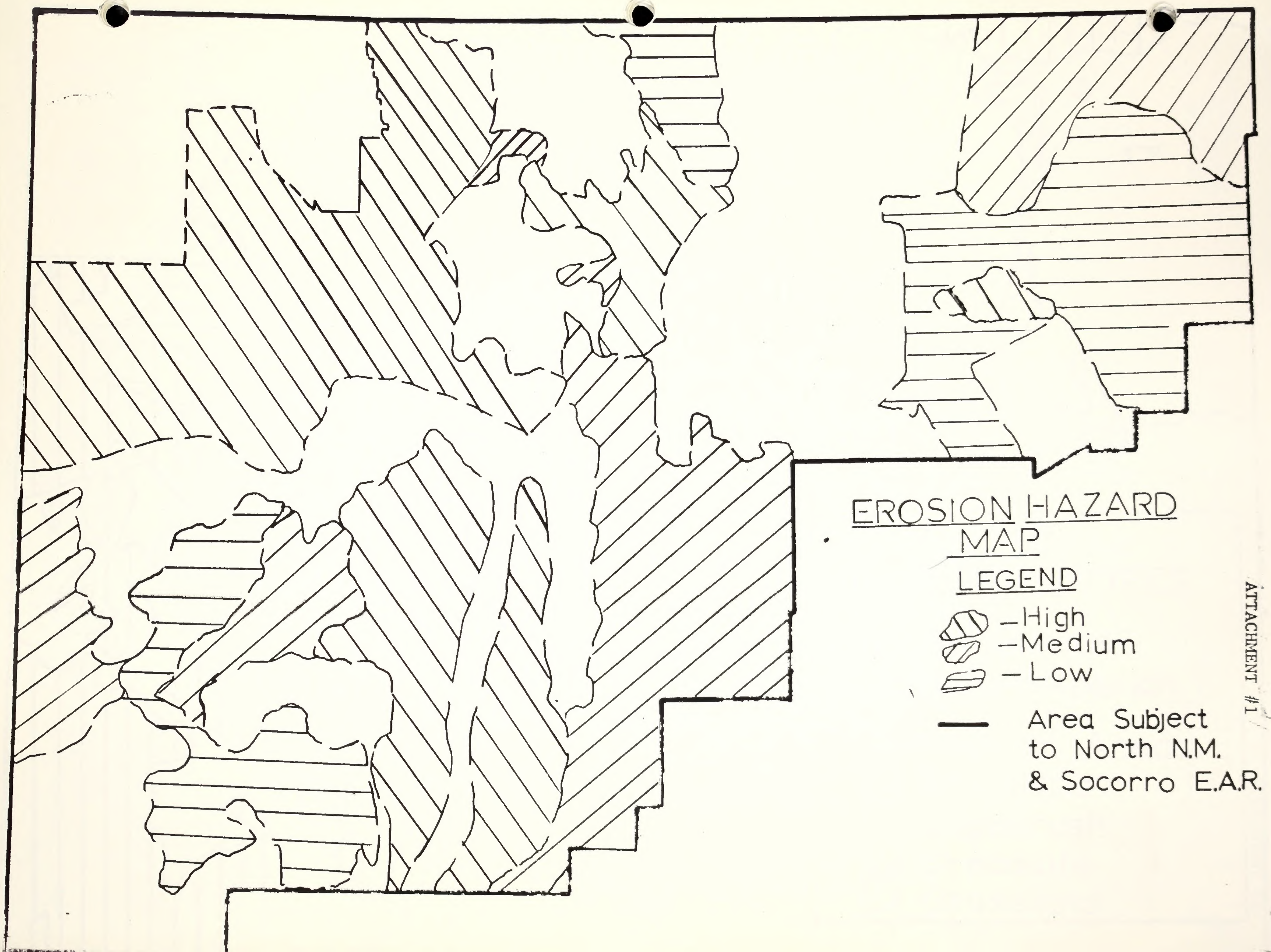
9 July 1974
Date

Concurred by: R Keith Miller — July 9, 1974
R. Keith Miller, District Manager — Date

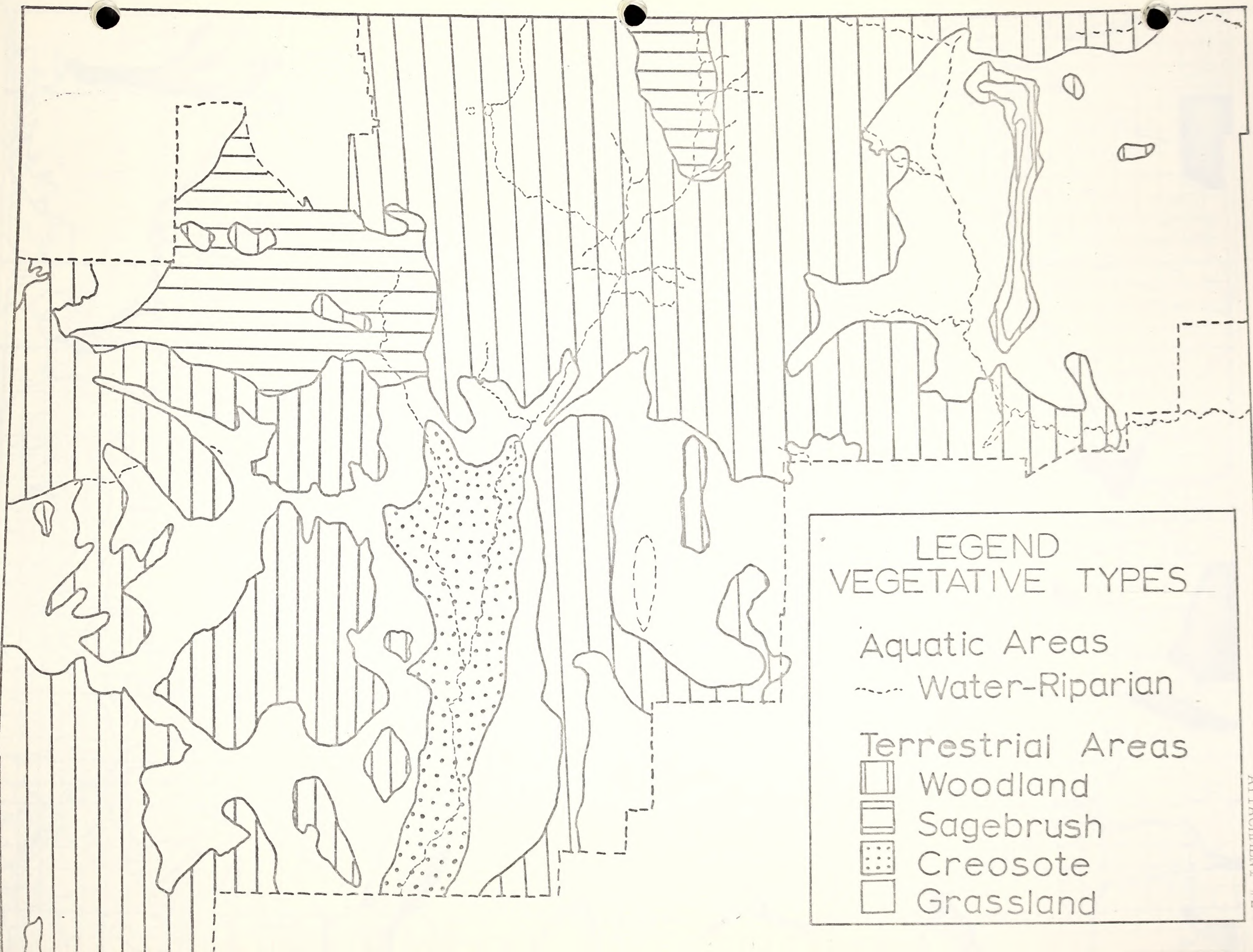
Arlen P Kennedy — July [illegible]
Arlen P. Kennedy, District Manager — Date

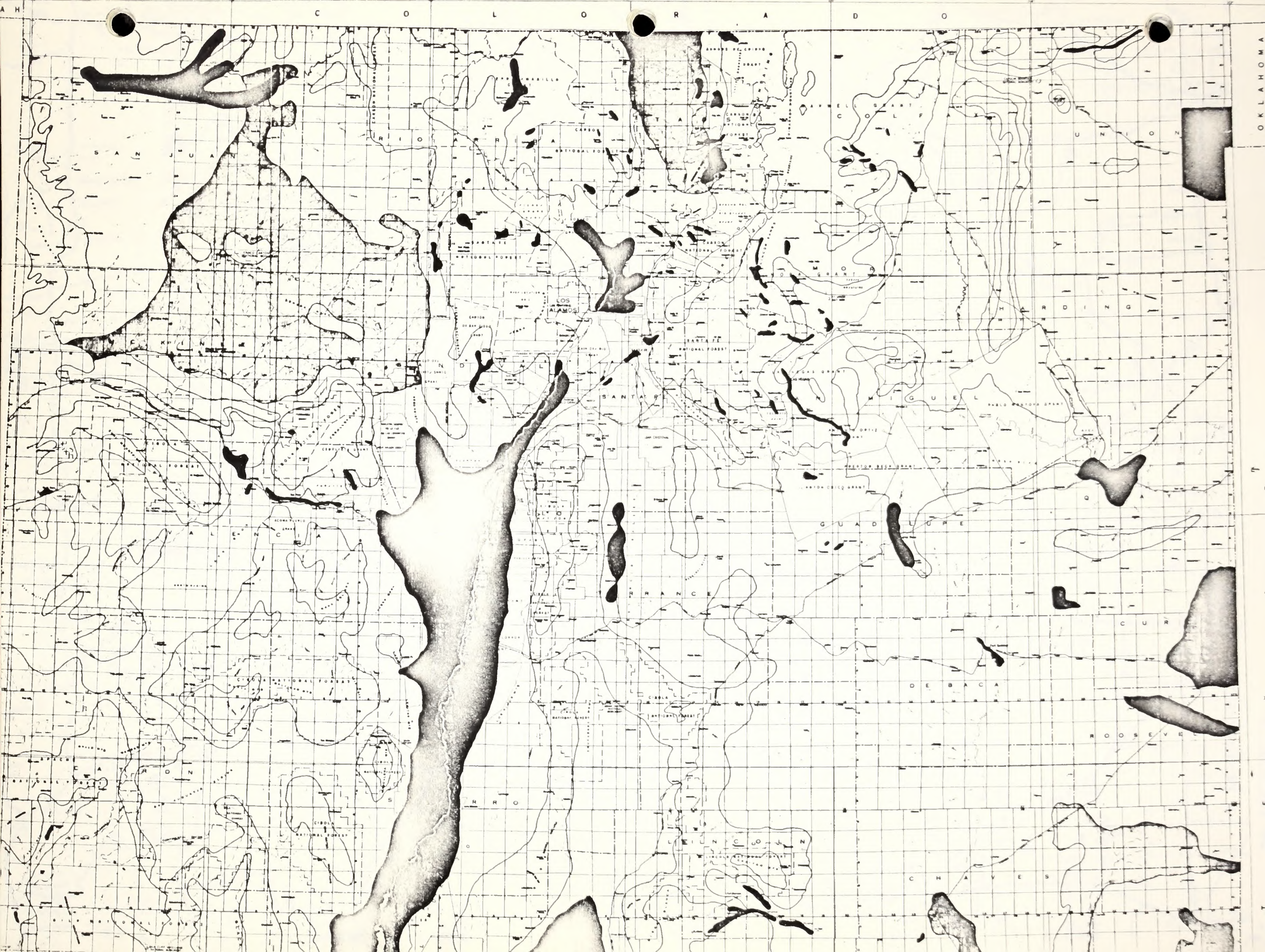
ATTACHMENTS

ATTACHMENT #1



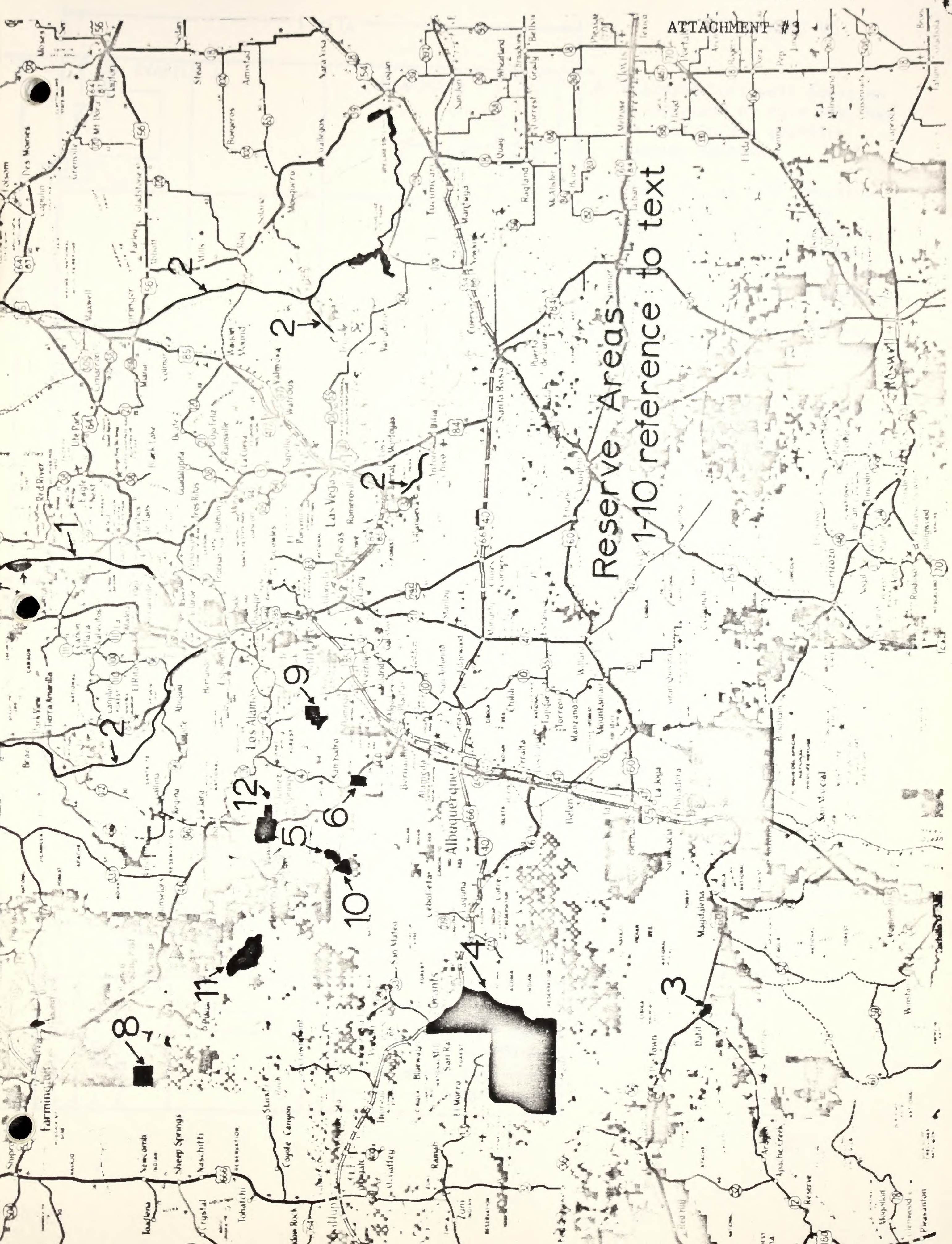
ATTACHMENT #2




COLORADO
OKLAHOMA
AH
SAN JUAN
RIO ARRIBA
TAOS
COLFAX
MAXWELL GRANT
UNION
MORA
MORA GRANT
HARDING
McKINLEY
SANDOVAL
LOS ALAMOS
SANTA FE
SANTA FE NATIONAL FOREST
CARSON NATIONAL FOREST
SAN MIGUEL
PABLO MONTOYA GRANT
LAS VEGAS GRANT
PRESTON BECK GRANT
ANTON CHICO GRANT
QUAY
GUADALUPE
TORRANCE
CIBOLA NATIONAL FOREST
VALENCIA
ACOMA PUEBLO
CATRON
SOCORRO
LINCOLN
LINCOLN NATIONAL FOREST
DE BACA
CUR
ROOSEVE
CHAVES

ATTACHMENT #4

ATTACHMENT #3



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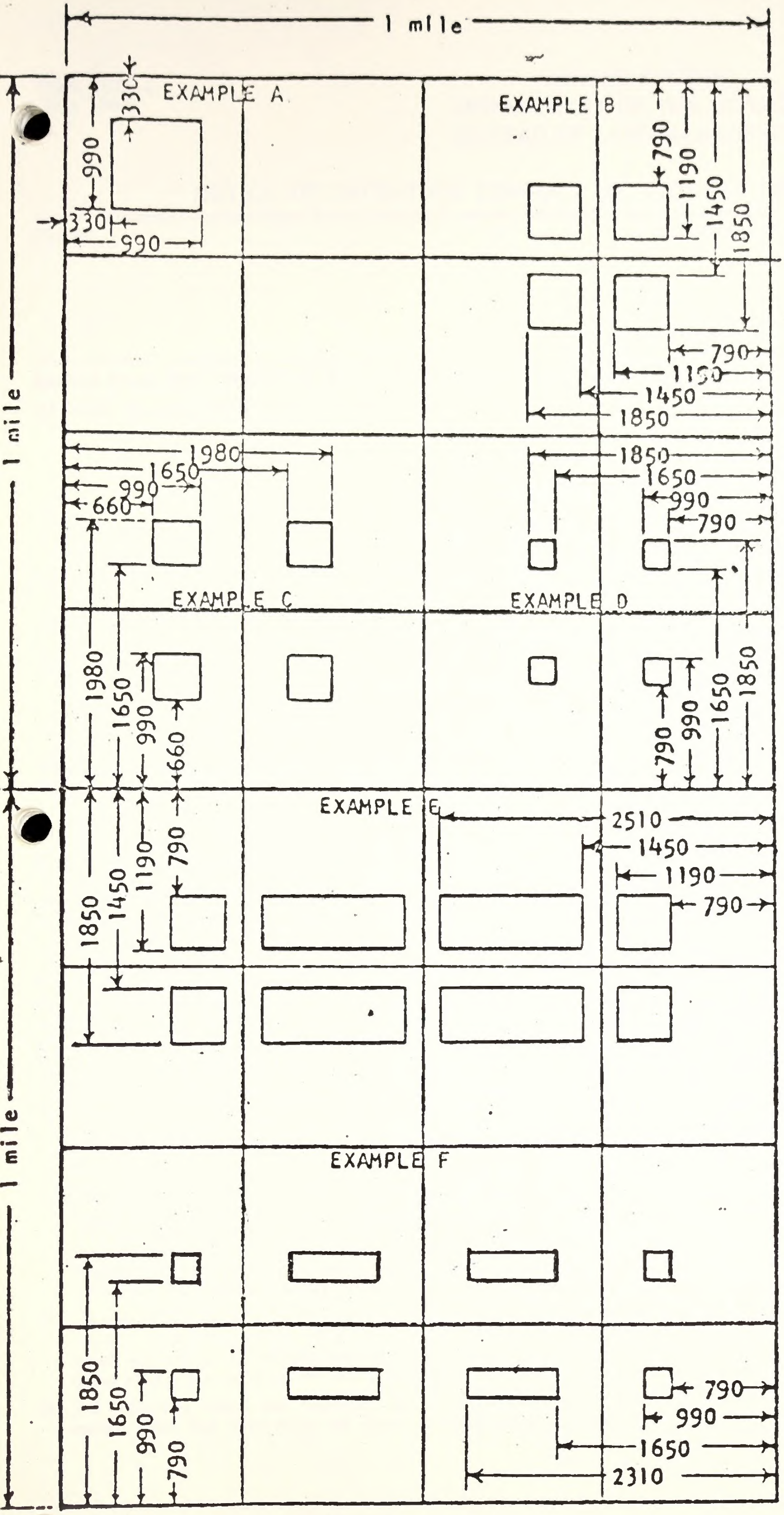

A. Statewide oil well location as provided by Rule 104. May be used in any quarter-quarter section.

B. Standard gas well location for the San Juan Basin except for Dakota Producing Interval (see E & F below). May be used in any quarter section except for Blanco-Mesaverde Pool where the location must be in either the northeast or southwest quarter.

C. Standard gas or oil location for Southeast New Mexico as per Rule 104 except as provided by special pool rules.

D. Standard location for either gas or oil for the San Juan Basin as per Rule 104.

E. Standard Dakota gas well location in San Juan and Rio Arriba Counties. May be used in any half-section as provided by Order R-1287 and R-1287-A.

F. Standard location for either oil or Dakota gas (R-1287 and R-1287-A), or multiple completions where one zone is Dakota gas as in E above.

ATTACHMENT #6

Form 3107–1
(July 1967)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

NOTICE OF INTENT TO CONDUCT OIL AND GAS EXPLORATION OPERATIONS

Name

Address *(include zip code)*

hereby files this "Notice of Intent to Conduct Oil and Gas Exploration Operations" across and upon *(give description of lands by township(s) and range)*

The type of operation to be pursued is ☐ magnetometer ☐ seismograph ☐ other *(specify)*

Approximate date of commencement of operations . Upon completion of , the Bureau of Land Management District Manager shall be furnished a "Notice of Completion of Oil and Gas ploration Operations."

The undersigned agrees that oil and gas exploration operations will be conducted pursuant to the following terms and conditions:

1. Exploration operations shall be conducted in compliance with all Federal, State and County laws, ordinances or regulations which are applicable to the area of operations including, but not limited to, those pertaining to fire, sanitation, conservation, water pollution, fish and game. All operations hereunder shall be conducted in a prudent manner.
2. Due care will be exercised in protecting lands in this notice. All necessary precautions shall be taken to avoid any damage other than normal wear and tear, to gates, bridges, roads, culverts, cattle guards, fences, dams, dykes, vegetative cover and improvements, and stock watering and other facilities.
3. Appropriate procedures shall be taken to protect any shafts, pits or tunnels, and shot holes shall be capped when not in use to protect the lives, safety, or property of other persons or of wildlife and livestock.
4. All vehicles shall be operated at a reasonable rate of speed, and due care must be taken to safeguard all livestock and wildlife in the vicinity of his operations. Bulldozers shall not be used without advance notification to the District Manager. Existing roads and trails shall be used wherever possible; if new roads and trails are made, care should be taken to follow natural contours of the lands where feasible and restoration and/or reseeding, as requested by District Manager shall be made.
5. Upon expiration, revocation or abandonment of operations conducted pursuant to this "Notice," all equipment shall be removed from the land and the land shall be restored as nearly as practicable to its original condition by such measures as the District Manager may specify. All geophysical holes must be safely plugged. Upon leaving the land, the District Manager shall be informed.
6. Upon request, the location and depth of water sands encountered shall be disclosed to the District Manager.
7. The party conducting such operations shall contact the District Manager prior to actual entry upon the land in order to be apprised of the practices which should be followed or avoided in the conduct of his operations in order to minimize damages to property of the United States.

(Signature)

(Signature of Geophysical Operator)

(Address including zip code)

(Address including zip code)

ATTACHMENT #7

March 3 1849

United States Department of the Interior

GEOLOGICAL SURVEY

Conservation Division
Southern Rocky Mountain Area

NOTICE

(September 1, 1973)

To: All Lessees and Operators of Federal and Indian Oil and Gas Leases

In order that the Department may properly protect the environment during the development of all Federal and Indian leased mineral resources - Each Application for Permit to Drill under a Federal and Indian oil and gas lease must be accompanied by a Development Plan for Surface Use covering all proposed operations that might disturb the surface prior to commencing development work under the lease. One copy of the plan must be attached to each copy of the Application for Permit to Drill.

The Application for Permit to Drill and the Development Plan for Surface Use must be filed in sufficient time before you contemplate commencing any operations to allow adequate time for contacting the appropriate surface management agency and joint inspection of the proposed well location and access road where necessary.

A subsequent Development Plan for Surface Use must be submitted for approval when any changes in the proposed operation are necessary or if additional surface is to be used at a later date.

Work on roads and drilling locations must not be commenced prior to approval of the Application for Permit to Drill. A copy of the drilling permit and Development Plan for Surface Use must be posted at the drill site.

The following is furnished for your information and guidance in preparing the required Development Plan for Surface Use:

1. Existing roads including location of the exit from the main highway.

   This information should be submitted on a map (USGS topographic, county road, or oil field map with a scale sufficient to be legible) and include at least one locatable reference point and the main access road in the vicinity of the proposed location along with all existing roads within a minimum 3-mile radius of the proposed location. Trails and shortcuts need be shown only if they will be used for access. Additional required information under Nos. 2, 3, and 4 below may be placed on this map if appropriately labeled.

2. Planned access roads.

This information should be submitted on a map and include all access roads that are to be constructed or improved upon or used in connection with the drilling and producing of the proposed well. Road construction should be kept to a minimum. Indicate the length and width of new road. Indicate whether roads will be compacted or surfaced. Operator should keep in mind that he may be required to restore the surface to its original condition.

3. Location of existing wells.

This information should be submitted on a map and include all wells (abandoned, temporarily abandoned, shut-in, injection, drilling, etc.) within a one-mile radius of the proposed location for a development well. For exploratory well drill sites, such information should be shown within a two-mile radius of the proposed location. An exploratory well is a well two miles or more from an existing Known Geologic Structure or if not established, two miles or more from an existing producible well.

4. Lateral roads to well locations.

This information should be submitted on a map and include all lateral roads to all well locations within one-mile radius of the proposed location. This information may be previously covered by the data given for Nos. 1 and 2.

5. Location of tank batteries and flow lines.

This information should be submitted on a plat or map showing the proposed location of the tank battery and flow lines associated with the proposed well in the event production is established. Future development of the lease should be considered in the location of the tank battery. Existing tank batteries and flow lines within a ½-mile radius of the proposed location should be shown.

6. Location and type of water supply (rivers, creeks, lakes, ponds, well, etc.).

This information may be shown on a plat or map or may be a written description. Source of all water to be used in the drilling operations of the proposed well should be noted. Location of necessary water lines should be indicated.

7. Methods for handling waste disposal.

A brief written description should be given of the methods for disposing of each type of waste material (cuttings, garbage, trash, etc.) from the drilling of the proposed well. If additional surface is to be used for disposal of any waste material from producing operations, a subsequent Development Plan for Surface Use must be submitted.

8. Location of camps.

Where applicable, this information may be shown on a map or plat, or be a written description of the location of the drill camp site. Any proposed permanent-type structures should be noted.

9. Location of airstrips.

Where applicable, any airstrip that is to be constructed or maintained for use during the drilling operations should be shown on a map.

10. Location of layout to include position of the rig, mud tanks, reserve pits, burn pits, pipe racks, etc.

This information should be shown on a plat with the approximate scale used and the compass direction shown. The general topography in the immediate area should be shown or described on the plat so the location of rig and associated facilities in relation to the surface features is apparent. Indicate whether drilling pad will be compacted or surfaced.

11. Plans for restoration of the surface.

State the proposed program for surface restoration upon completion of operation (stockpiling topsoil, leveling, reseeding, seed mixture, etc.). Such plans will be reviewed by the surface agency for adequacy.

12. Any other information that may be used in evaluating the impact on environment. Include general description of the topography, vegetation, and other aspects of the area.

Any available information that would be useful in evaluating the environmental aspects of the operation, including proximity to steep hillsides and gullies, cut and fill needed, etc., should be included. A photograph of the proposed drill site might expedite clearance.

Furnish the name, phone number of your field representative responsible for compliance of the Development Plan for Surface Use.

ATTACHMENT #8

Form 9-331
(May 1963)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1424.

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals.)

1. OIL WELL ☐ GAS WELL ☐ OTHER

2. NAME OF OPERATOR

3. ADDRESS OF OPERATOR

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.* See also space 17 below.)
At surface

14. PERMIT NO.

15. ELEVATIONS (Show whether DF, RT, GR, etc.)

5. LEASE DESIGNATION AND SERIAL NO.

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME

8. FARM OR LEASE NAME

9. WELL NO.

10. FIELD AND POOL, OR WILDCAT

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA

12. COUNTY OR PARISH

13. STATE

16. **Check Appropriate Box To Indicate Nature of Notice, Report, or Other Data**

NOTICE OF INTENTION TO:

- TEST WATER SHUT-OFF ☐
- FRACTURE TREAT ☐
- SHOOT OR ACIDIZE ☐
- REPAIR WELL ☐
- (Other)
- PULL OR ALTER CASING ☐
- MULTIPLE COMPLETE ☐
- ABANDON* ☐
- CHANGE PLANS ☐

SUBSEQUENT REPORT OF:

- WATER SHUT-OFF ☐
- FRACTURE TREATMENT ☐
- SHOOTING OR ACIDIZING ☐
- (Other) ______
- REPAIRING WELL ☐
- ALTERING CASING ☐
- ABANDONMENT* ☐

(NOTE: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.) *

18. I hereby certify that the foregoing is true and correct

SIGNED ______ TITLE ______ DATE ______

(This space for Federal or State office use)

APPROVED BY ______ TITLE ______ DATE ______
CONDITIONS OF APPROVAL, IF ANY:

Instructions

General: This form is designed for submitting proposals to perform certain well operations, and reports of such operations when completed, as indicated, on Federal and Indian lands pursuant to applicable Federal law and regulations, and, if approved or accepted by any State, on all lands in such State, pursuant to applicable State law and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 17: Proposals to abandon a well and subsequent reports of abandonment should include such special information as is required by local Federal and/or State offices. In addition, such proposals and reports should include reasons for the abandonment; data on any former or present productive zones, or other zones with present significant fluid contents not sealed off by cement or otherwise; depths (top and bottom) and method of placement of cement plugs; mud or other material placed below, between and above plugs; amount, size, method of parting of any casing, liner or tubing pulled and the depth to top of any left in the hole; method of closing top of well; and date well site conditioned for final inspection looking to approval of the abandonment.

U.S. GOVERNMENT PRINTING OFFICE: 1963—O-685229

847 - 485

ATTACHMENT #9

7/73

STATE OF NEW MEXICO GUIDELINES
BETWEEN
BUREAU OF LAND MANAGEMENT
AND
GEOLOGICAL SURVEY
FOR
CARRYING OUT SECRETARIAL ORDER 2948

The term "area of operations" as used in the Secretarial Order delineates a geographic area in which the Geological Survey exercises the Secretary's delegated authority with respect to all surface and subsurface operations. For exploratory oil and gas drilling, the "area of operations" comprises the drilling pad. Maps delineating the area of operations for productive areas will be furnished BLM District Managers by the Survey. Such maps will be revised from time to time as necessary.

Within the "area of operations," Survey personnel are responsible for making final decisions, subject to BLM and GS agreement, regarding proposed operations, for contacting the operator, and for seeing that the required work is done. Survey personnel will work closely with BLM, will enforce stipulations necessary for the protection of the surface, and will not grant approval of any drilling operation without the prior consent of BLM. Operations outside of the "area of operations" are under the direct control of BLM personnel.

The GS will not issue a drilling permit which is inconsistent with BLM recommendations without further discussion with BLM. Any unresolvable disagreement with permit conditions will be settled under procedures established by Sec. 2(a) of Secretarial Order No. 2948.

APPLICATIONS FOR DRILLING PERMITS

USGS will:

1. Upon receipt of an application for a drilling permit, immediately send a copy of such application, with all attachments, to the proper BLM office.

2. Schedule a joint environmental analysis field inspection for exploratory wells and other wells in a known environmentally sensitive area to be made within three weeks from receipt of the Application for Permit to Drill. All effort by both agencies will be made to schedule the field inspection within 10 days from receipt of the Application for Permit to Drill.

3. Schedule the time for such inspections as soon as possible, considering work priorities; however, the BLM should be allowed at least seven working days prior to any commitment being made for an inspection date. Time may be reduced on high priority conditions.

4. Encourage the operators to submit field development plans or drilling schedules to permit lead time for evaluating environmental considerations, resource conflicts and land use planning alternatives and revised plans prior to official submission. Furnish BLM such plans or schedules and invite BLM participation.

5. So far as possible, schedule drill site inspections in order that several future drill sites, access roads, etc., can be inspected at one time.

BLM will:

1. Provide a representative for individual and/or multi-site field inspections.

2. Within five working days following the joint drill site inspection, or within ten working days after receipt of the Application for Permit to Drill by BLM, if no joint inspection is made, provide the GS with a report setting forth recommendations necessary to protect the surface resource.

3. Notify GS immediately of any necessity for joint field inspections of wells other than exploratory which may require GS representation.

4. As necessary, prepare an internal environmental analysis in order to determine impact and formulate recommendations to CS concerning Applications for Permit to Drill, on development wells.

PERMITS TO DRILL

USGS will:

1. Furnish immediate notification of all approved drilling permits to the appropriate BLM office. This will include, if not previously submitted to BLM, a copy of the agreed upon development plan, conditions and stipulations, and, if prepared by GS, the environmental analysis.

2. Require the operator to have a copy of the drilling permit, development plan, and any special conditions at the drilling site to help insure that on-the-ground contractors are completely aware of the drilling and surface protection requirements. The plan must be posted in a conspicuous location during all drilling and completion operations.

COMPLIANCE

USGS will:

1. Make periodic compliance checks to insure that permittee is living up to stipulations agreed upon between BLM and USGS.

2. Seek BLM assistance and expertise in circumstances involving surface management conflicts concerning stipulations and the operator's ability to meet them.

3. Notify BLM of non-compliance which may require rehabilitation plans.

✓ 4. Request the BLM to make compliance check if appropriate.

5. On spills such as pipeline ruptures, sludge pit breaks, etc., seek BLM expertise as to surface reclamation and rehabilitation.

BLM will:

1. At the request of GS or in the course of its own duties, note operator compliance with drilling permit stipulations and notify GS immediately of any non-compliance.

2. Contact the operator directly in cases involving an emergency found while performing field work, including spills, pipeline breaks, or other conditions immediately endangering health, safety, or significant resources.

GS will be notified of any actions of this nature immediately. At this time, agreement will be made with GS concerning resolution of the emergency and BLM's continued involvement.

MAINTENANCE OF OIL AND GAS FIELD FACILITIES

USGS will:

1. Require operators to file, for approval, a suitable plan with GS prior to undertaking any maintenance, reconstruction or alteration of facilities, including roads, dams, reservoirs, etc., which will result in surface disturbance.

Operator must submit to GS enough information concerning the proposed activity to allow evaluation of possible surface disturbance.

2. Notify BLM of proposed surface disturbing activity and furnish available information.

3. Approve proposed action only after consultation with BLM.

4. Give operator approval to proceed subject to expressed conditions agreed upon by GS and BLM.

5. Make periodic inspections to assure proper operator maintenance of facilities.

BLM will:

1. Respond timely to GS's notification by providing recommended stipulations concerning the proposed action.

2. Cooperate with GS and operator in resolving conflicts concerning stipulations, if necessary.

3. Notify GS of any maintenance condition warranting correction. The BLM, on its own initiative, may make recommendations through USGS to the operator for the maintenance, restoration, and rehabilitation of existing conditions within a developed field.

ABANDONMENT

USGS will:

1. Notify BLM of cancellations or terminations of any permits issued, under which no activity has taken place.

2. Send BLM copy of all Notices of Intention to Abandon.

3. Approve and stipulate subsurface plugging by operator when appropriate.

4. If usable water has been discovered in the well to be abandoned, advise BLM for necessary action in accordance with existing procedures.

5. Not approve the subsequent Report of Abandonment until BLM confirms satisfactory completion of surface rehabilitation.

BLM will:

1. Take appropriate action under existing procedures when notified by USGS of usable water.

2. Work directly with the operator concerning surface rehabilitation.

3. Notify GS of operator's satisfactory completion of surface rehabilitation.

4. Notify GS of any failure on the part of the operator to undertake surface rehabilitation measures required by BLM.

5. Request that USGS waive the requirement for an abandonment marker if desirable.

GENERAL

USGS will:

1. As appropriate, coordinate and communicate with lessees and operators concerning area development plans and other information requirements prior to their submission of drilling applications.

BLM will:

1. If appropriate, communicate with lessees and operators prior to submission of drilling applications to expedite BLM's input concerning surface management.

BLM and USGS will:

1. Periodically hold joint meetings with lessees, operators, contractors and other involved parties to discuss problems, stipulations, working agreements, and other items of common concern.

2. May, as appropriate, enter into GS Area Office and BLM State Office level guidelines to further define responsibilities and mutual cooperation under S.O. 2948.

3. Meet together periodically at the BLM State Office and GS Area Office level to discuss past and future procedures under S. O. 2948.

ATTACHMENT #10

United States Department of the Interior
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

BUR. OF LAND MGMT.
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STATE OFFICE
SANTA FE, NEW MEXICO

October 6, 1972

ORDER NO. 2948 ✓

Subject: Division of Responsibility Between the Bureau of Land Management and the Geological Survey for Administration of the Mineral Leasing Laws - Onshore

Sec. 1. Purpose. The purpose of this Order is to set forth the administrative and management procedures for Departmental onshore mineral leasing and operating activities. The spirit and intent of this Order flow from the Department's mineral management objectives of: orderly and timely resources development, protection of the environment, and receipt of fair market value for leased mineral resources.

Sec. 1(a) Orderly and Timely Resource Development includes the Department's responsibilities to:

(1) Foster, promote, and encourage the exploration for and the production of the mineral deposits from the leasable lands; promote competition;

(2) Encourage the active development of the mineral deposits in the leasable lands in a manner compatible with the use of the same lands for other purposes; assure that mineral developers receive the acreage necessary for economic plant investment, development, and production;

(3) Encourage the maximum ultimate recovery of the mineral deposit; prevent waste; promote the conservation of the mineral resources;

(4) Assure adequate minimum production and diligent development requirements for mineral deposits.

(b) Protection of the Environment includes the Department's responsibilities to:

(1) Assure that mineral exploration and production be conducted with the maximum protection of the environment;

(2) Assure the rehabilitation of disturbed lands;

(3) Assure that precautions are taken to protect public health and safety; and

(4) Assure full compliance with the spirit and objectives of the National Environmental Policy Act of 1969, other Federal environmental legislation, and supporting Executive Orders and regulations.

(c) Receipt of Fair Market Value for Leased Mineral Resources includes the Department's responsibilities to assure the public a fair market value return for the use of public lands and the disposition of its mineral resources.

Sec. 2. Agency Responsibilities. The BLM exercises at the Bureau level the Secretary's discretionary authority to determine whether or not leases, permits, and licenses are to be issued. The Bureau of Land Management is responsible for issuing mineral leases, permits, and licenses, and is the office of record in mineral leasing matters. The Geological Survey is responsible for all geologic, engineering, and economic value determinations for the Department's mineral management program. These determinations include: the mineral characteristics of lease and permit areas; parcelling; amounts of bonds; royalties; unit values; rentals; mineral resource evaluations; reserves; investment, diligent development, and minimum production requirements; and all other terms and conditions relating to mineral operations under leases and permits. Geological Survey exercises the Secretary's delegated authority regarding operations conducted within the area of operation by permittees, lessees, and licensees and determines the actions to be taken by them from the standpoint of the development, conservation, and management of mineral resources under the jurisdiction of the Department. GS will refer to BLM any instances of noncompliance with lease terms requiring cancellation action, and BLM will inititate the necessary action.

For the purpose of this Order, the area of operation is defined as that area of the present and planned mine, oil and gas field, or geothermal resource field exploratory, development, and production operations, as presented in an approved exploration or mining plan, drilling permit, oil, gas, or geothermal field development plan, or plan for the abandonment of wells or operations. The area of operation may cover a fraction of a lease or permit area, or it may cover several lease or permit areas. It encompasses the general area needed for storage piles, spoils piles, tailings ponds, on-project mill sites, flow lines, separators, surge tanks, storage tanks, on-project truck or rail-loading stations, drill pads, mud pits, workshops, compressors, generators, on-project power plants, and other such facilities used for on-project mine, oil and gas field, or geothermal resource field exploratory, development, and production operations.

(a) Environmental Protection. The Bureau of Land Management, in cooperation with the Geological Survey, formulates the general requirements to be incorporated in leases, permits, and licenses for the protection of the surface and non-mineral resources and for reclamation. The Geological Survey, before approving exploration and mining plans, drilling permits, oil, gas, or geothermal field development plans, or plans for the abandonment of wells or operations, consults with the Bureau of Land Management on the adequacy of the surface use, environmental protection, and reclamation aspects of the plans and will not grant approval if inconsistent with the BLM's recommendations without further discussions with BLM. If differences remain after these further discussions, the resolution is made by the Assistant Secretary--Mineral Resources and the Assistant Secretary--Public Land Management. If required, the Under Secretary resolves any remaining differences. The BLM is responsible for compliance examinations of environmental protection requirements outside the operating area and for reporting infractions to the GS for discussions with, or orders to, the permittee, lessee, or licensee. GS examines operations to ensure compliance with environmental protection and rehabilitation requirements inside the operating area. With respect to approval of access roads, pipelines, utility routes and other surface uses outside the operating area, the Bureau of Land Management has the primary responsibility but obtains the recommendations of the Geological Survey before taking final action. Orders to operators for any remedial action is the responsibility of the Geological Survey.

(b) Expertise. The Geological Survey is responsible for maintaining engineering, geologic, geophysical, economic, and other technical expertise needed by the Department to assure compliance with applicable laws, operating regulations, and the objectives of the Department's mineral management program. The Bureau of Land Management is responsible for maintaining expertise needed by the Department for action on applications filed with BLM under the mineral leasing laws to assure compliance with applicable laws, leasing regulations, and the objectives of the Department's mineral management program.

(c) Contacts with Applicants.

(1) Prior to the issuance of mineral leases, permits, and licenses, the Bureau of Land Management will represent the Secretary in dealing with applicants.

(2) After issuance and during the exploration, development, and production phases of leases, permits, and licenses, and until a lease, permit, or license has terminated (at which time management is the sole responsibility of BLM) the Geological Survey is the sole representative of the Secretary in all matters relating to the supervision of operations.

Sec. 3. Issuance of Mineral Leases, Permits, and Licenses.

(a) Applications. Prior to the issuance of mineral prospecting permits, leases, or licenses, the Bureau of Land Management refers all applications for such permits, leases, or licenses to the Geological Survey for a report as outlined in (b) below.

(1) The Geological Survey is responsible for determining, under the mineral leasing laws and regulations, if sufficient information is known about a mineral deposit to warrant offering the deposit for lease by competitive sale and to notify the Bureau of Land Management of its determination. If the Geological Survey finds that sufficient information is not available to warrant competitive leasing, it notifies the Bureau of Land Management of its conclusions so that the Bureau of Land Management may issue a prospecting permit or noncompetitive lease, as appropriate. ? John The Geological Survey establishes prospecting requirements for prospecting permits. When lands are to be leased, the Geological Survey determines and reports, as appropriate, on: the mineral characteristics of lease and permit areas; parcelling; amounts of bonds; royalties; unit values; rentals; mineral resource evaluations; reserves; investments; diligent development and minimum production requirements; and all other terms and conditions pertaining to lease operations, including environmental and surface rehabilitation stipulations relating to mineral exploration and extraction. With respect to applications for licenses, the Geological Survey determines and reports as to whether the license may be issued.

(2) The Geological Survey is responsible for determining whether a prospecting permittee has demonstrated that the lands contain a mineral deposit having the characteristics required by law and regulations to qualify for a preference right lease and to notify the Bureau of Land Management.

(3) The Bureau of Land Management refers to the Geological Survey all other type applications received which, if approved, may affect operations on existing permits, leases, or licenses.

(4) The Bureau of Land Management notifies the Geological Survey of known oil, gas, and geothermal resource geophysical exploration activity, including the area involved, the type of survey employed, and the name of the operator.

(5) All applications for noncompetitive oil and gas, mineral, and geothermal resource leases filed with the Bureau of Land Management will, prior to issuance of a lease, be referred to the Geological Survey for a determination as to whether the lands are within a known geologic structure (KGS), a known geothermal resource area (KGRA), or a known leasing area (KLA).

(b) Mineral Resource Evaluation Report. GS is responsible for submitting a report of its findings, mineral resource evaluations, and resultant recommendations to the BLM, together with a summary explanation of how the resource evaluations were developed from geophysical, geologic, economic, and engineering data available at the time of the evaluation. The BLM reviews these findings and recommendations in light of multiple-use management requirements and will not issue leases or permits inconsistent with the findings and recommendations without further discussion with GS. If differences remain after further discussion, the resolution is made by the Assistant Secretary--Mineral Resources and the Assistant Secretary--Public Land Management. If required, the Under Secretary resolves any remaining differences.

(c) Competitive Lease Sales. The Bureau of Land Management advertises and conducts competitive lease sales. The Geological Survey's resource evaluations will be used and the Geological Survey will have representatives at the sale and renders a post-sale recommendation to BLM regarding acceptance or rejection of the bids, which must be confirmed in writing.

(d) Files and Records. BLM maintains the official application, permit, and lease case files and forwards to the Geological Survey a copy of each permit, lease, and license, together with copies of relevant correspondence thereafter conducted by the Bureau. The GS forwards to the BLM copies of mining and exploration plan applications, drilling permit applications, and relevant items submitted by the applicants directly to the GS, except confidential proprietary information cited under paragraph (e) below.

(e) Security of Information. The Geological Survey is responsible for receiving and protecting for the confidential use of the Federal Government all proprietary geological, geophysical, engineering, economic, statistical, or other information, mineral resource data, and well logs required to be submitted under Title 30 CFR, Parts 200, 211, 216, 221, 231, 270, and related regulations. The Survey Office receiving such information is designated the Office of Control for those data. Authorized officials of BLM or other surface-managing agencies having a need to see such information will normally make appropriate arrangements to visit the Office of Control for access to such data and for technical advice based on it pertinent to their management responsibilities.

Sec. 4. Mineral Reports. The Geological Survey is responsible for preparing and submitting to the Bureau of Land Management mineral classification and evaluation reports with respect to the leasable mineral value of lands within proposed exchanges, withdrawals, sales, land entries, or other disposals and all other land transactions. The Geological Survey, upon request, also prepares and furnishes mineral reports and other information to the Bureau of Land Management needed for its use in long-range multiple-use planning or inventory of the public lands.

Sec. 5. General Relationships. Such additional references, reports, interchange of information, and advice shall be made by or between the Bureau of Land Management and Geological Survey as may be necessary to perpetuate or improve current practice and provide effective administration of the mineral leasing laws.

The Bureau of Land Management and the Geological Survey must submit to each other for review and recommendations any proposed changes in standard lease terms, regulations, instructions, or other changes that would affect each agency's management responsibilities.

Sec. 6. Implementation of Order. It is intended that there will be no duplication by the BLM or GS of the functions assigned by this Order. BLM and GS will promptly bring their manuals and instructions into agreement with the terms and the spirit and intent of this Order.

Sec. 7. Revocation. The Secretary's instruction (procedures relating to the administration of the mineral leasing laws - General Land Office and Geological Survey) dated September 22, 1925 (51 L. D. 219) is revoked.

OCT - 6 1972

Secretary of the Interior

ATTACHMENT #11

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SURFACE DISTURBANCE STIPULATIONS
OIL AND GAS LEASE

Area Oil and Gas Supervisor
(Address)

Management Agency *(name and address)*

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1. Notwithstanding any provision of this lease to the contrary, any drilling, construction, or other operation on the leased lands that will disturb the surface thereof or otherwise affect the environment, hereinafter called "surface disturbing operation," conducted by lessee shall be subject, as set forth in this stipulation, to prior approval of such operation by the Area Oil and Gas Supervisor in consultation with appropriate surface management agency and to such reasonable conditions, not inconsistent with the purposes for which this lease is issued, as the Supervisor may require to protect the surface of the leased lands and the environment.

2. Prior to entry upon the land or the disturbance of [illegible] surface thereof for drilling or other purposes, [illegible]e shall submit for approval two (2) copies of a map and explanation of the nature of the anticipated activity and surface disturbance to the Area Oil and Gas Supervisor and will also furnish the appropriate surface management agency named above, with a copy of such map and explanation.

An environmental analysis will be made by the Geological Survey in consultation with the appropriate surface management agency for the purpose of assuring proper protection of the surface, the natural resources, the environment, existing improvements, and for assuring timely reclamation of disturbed lands.

3. Upon completion of said environmental analysis, the Area Oil and Gas Supervisor shall notify lessee of the conditions, if any, to which the proposed surface disturbing operations will be subject.

Said conditions may relate to any of the following:

(a) Location of drilling or other exploratory or developmental operations or the manner in which they are to be conducted;

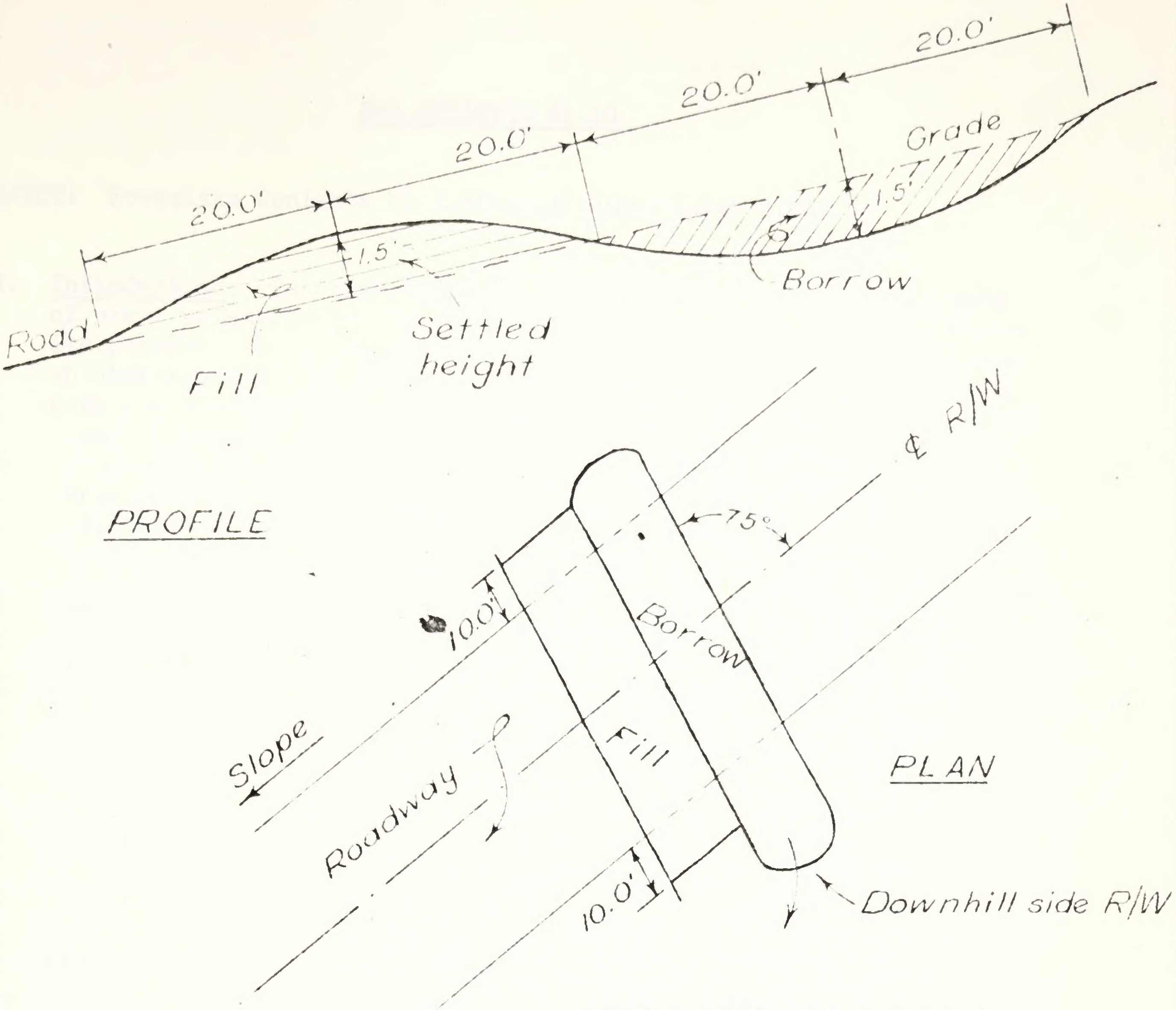
(b) Types of vehicles that may be used and areas in which they may be used; and

(c) Manner or location in which improvements such as roads, buildings, pipelines, or other improvements are to be constructed.

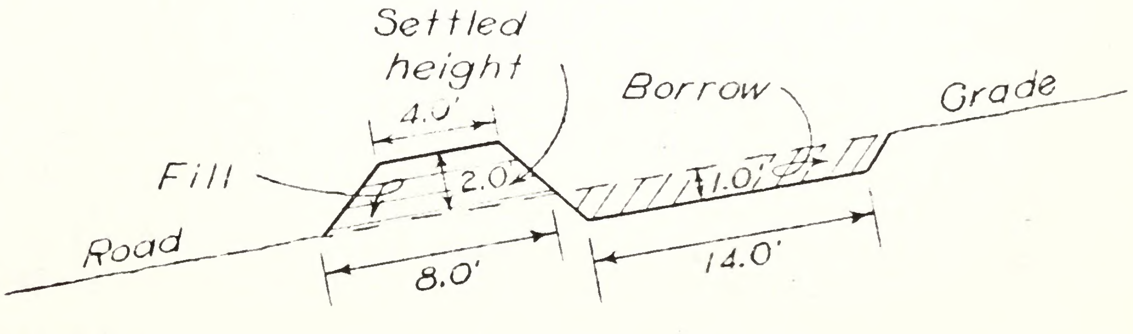
Form 3109–5 (May 1973)

✯ U.S. Government Printing Office: 1973– 784-259/2243 Region 8

ATTACHMENT # 12



THANK-U-MAM



No Scale

DIKE

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NEW MEXICO

ALBUQUERQUE DISTRICT

Ref: NM 7 Sketch

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration

ATTACHMENT #13

REA BULLETIN 61-10

SUBJECT: Powerline Contacts by Eagles and Other Large Birds

I. Introduction: In areas frequented by eagles and other large birds of prey, primarily herons and pelicans, power poles are often favorite perches. Occasionally through contact with wiring and fixtures on distribution line poles birds are electrocuted. Such contact also causes momentary or sustained outage of the powerline. Both of these incidents are undesirable and may be minimized by relatively inexpensive modifications in distribution structure design and fixtures by the power supplier. Because of their greater clearances, transmission line structures do not present a significant hazard to either small or large birds.

II. The Problem: Powerline contacts by large raptors, such as eagles and red-tailed hawks, in general are limited to localized areas where these birds hunt and nest. On any given system, it appears that remedial modification to frequently used power poles, within relatively short stretches of line, will greatly reduce the incidents of electrocution. It is probable that linemen and other operating personnel, after a short orientation, can readily identify the poles potentially most hazardous to birds. State and Federal wildlife authorities are available to conduct these orientations.

III. Behavior of Large Birds of Prey: In general, predatory birds select for perching those poles that give them the best view of the habitat of their quarry. Therefore, the poles selected often are the most elevated poles in areas heavily populated by ground squirrel, other rodents, and game within reasonable flying distance of the eyrie or within the wintering habitat of the raptor. Reports indicate that the birds are most likely to make contact between energized parts and ground wire on transformer poles. However, kills have occurred on single-phase and three-phase tangent poles as well. Favorite perch poles can be specifically determined by examining the area just below the pole for mutes or droppings of the birds and for their castings. Since birds of prey cannot digest the fur, feathers or bones of their quarry, they cast or disgorge these in the form of a pellet called a casting. These castings are as large as 1.5 inches in diameter and 5.0 inches in length.

IV. Remedial Measures: The illustrations and the text that follow (1) identify those details of standard construction that seem to contribute to eagle electrocution; and (2) offer suggestions for relatively inexpensive modifications which will make the various

structures less hazardous to large birds. Only the most commonly used structures are discussed, but an understanding of how these structures can cause electrocution and how they may be modified for greater safety will permit similar corrections to other less commonly used structures that may be involved in eagle electrocution.

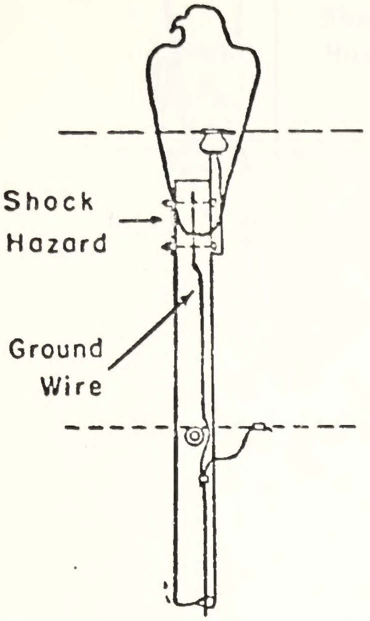


Figure 1

Single-Phase Poles Without Equipment

This structure is potentially hazardous to large birds only when the pole ground wire is extended above the neutral as shown in Figure 1. In such a case, contact could be made simultaneously between the phase conductor and pole ground wire when the bird landed on the poletop. Actually, the poletop does not seem to be a good perch because of the obstruction of the phase conductor. It is probable, therefore, that relatively few electrocutions will be experienced at these structures.

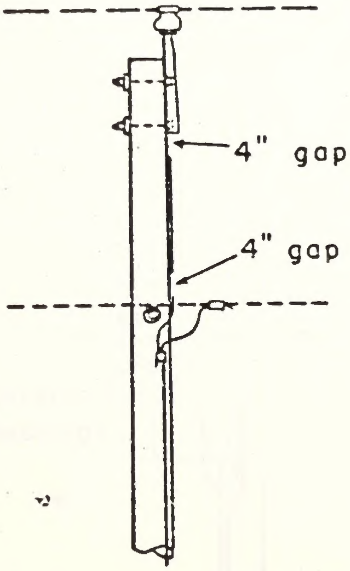


Figure 2

When electrocuted birds have been found at the base of single-phase structures, it is recommended that the ground wire be cut back to the neutral. If this is not feasible because of lightning considerations, the pole ground wire above the neutral should be double gapped as shown in Figure 2. A total of 8 inches of clear wood is believed adequate to provide safety to large birds.

Single-Phase Transformer Poles

On single-phase poles with transformers or other equipment, raptors may land on the grounded equipment tank and contact energized parts such as jumpers, open fuse links or bushing terminals. (See Figure 3.)

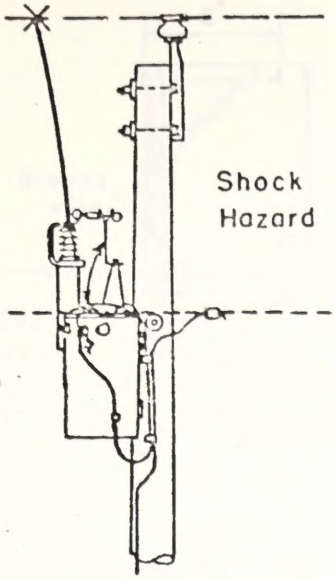
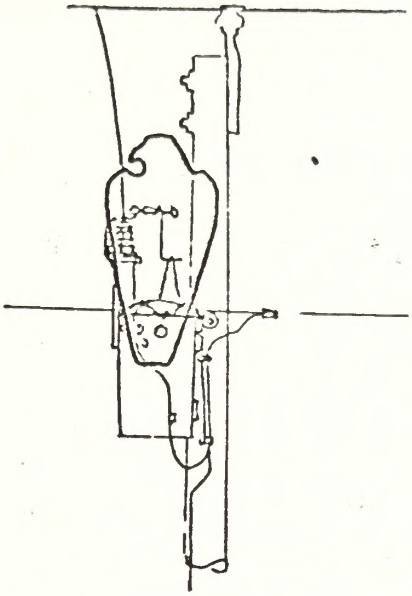


Figure 3



Depending on the type of transformer, it may be possible to cover all primary and secondary energized parts with which a bird is likely to make contact. The use of bird guards, transformers with internal fuses, and insulated conductors for primary jumpers should provide effective protection. (See Figure 4.)

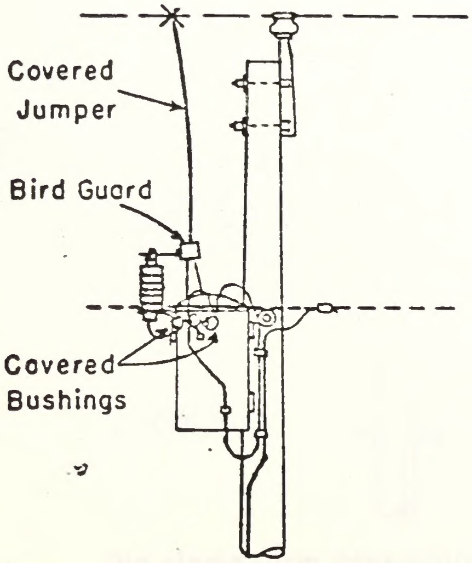


Figure 4

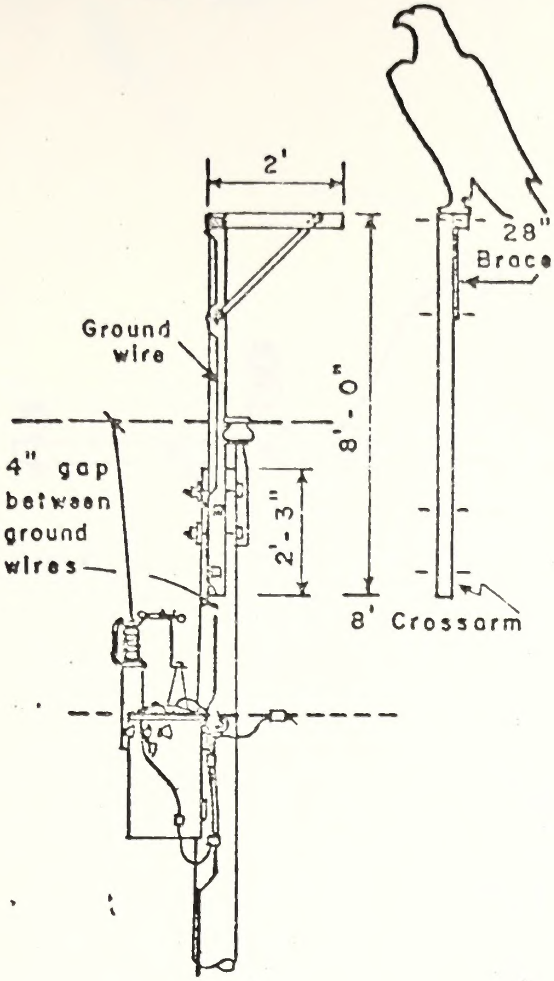
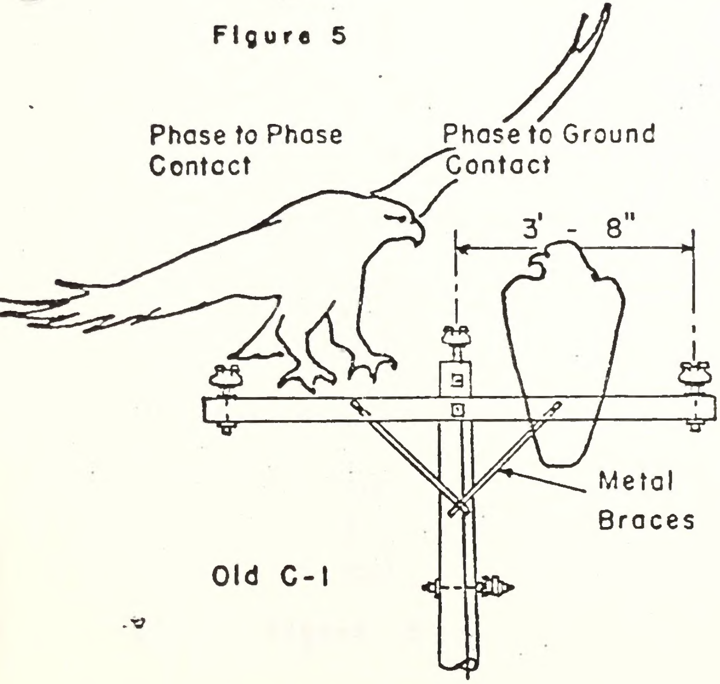


Figure 5

Where the nature of the equipment installation is such that it is not feasible to cover exposed energized parts, a perch as shown in Figure 5 could be installed. Eagles normally use such a perch in preference to the equipment tank. Alternatively the transformer could be changed to a self-protecting type which would permit covering the primary energized parts as in Figure 4.



Old single-arm assemblies

Figure 6

Three-Phase Tangent Construction

Of all REA poles in common use, pre-1962 REA standard construction is potentially the most hazardous to large birds because

- o its crossarm construction is particularly attractive as a perch to large birds.
- o its relatively flat construction permits phase-to-phase contact as the bird approaches the crossarm.
- o the use of steel crossarm braces in close proximity to the pole ground wire facilitates phase-to-ground contact.

Both of these types of contact are illustrated in Figure 6.

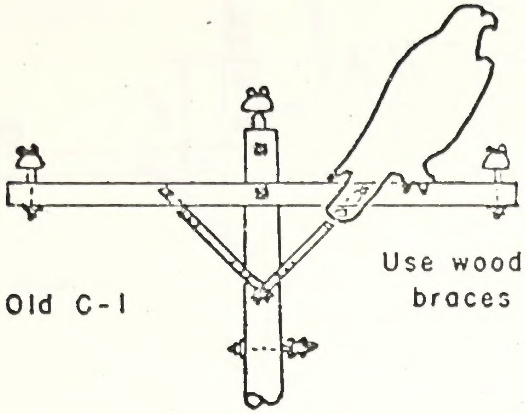


Figure 7

Bird electrocutions may be minimized on pre-1962 structures by changing the steel braces to wood braces as shown in Figure 7 and by covering the center phase for about 30 inches on either side of the insulator as shown in Figure 8. Any material used for covering the conductor need provide for only momentary contacts. However, it should not have any seams, cracks or openings on its top or sides through which a spark may jump. Several manufacturers provide "tree guards" which seem adequate for this purpose. Guards may be restrained from moving into the span by the use of a connector or other obstruction.

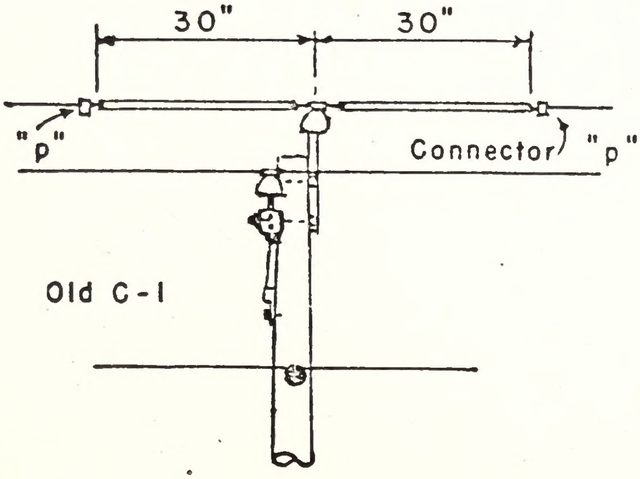


Figure 8

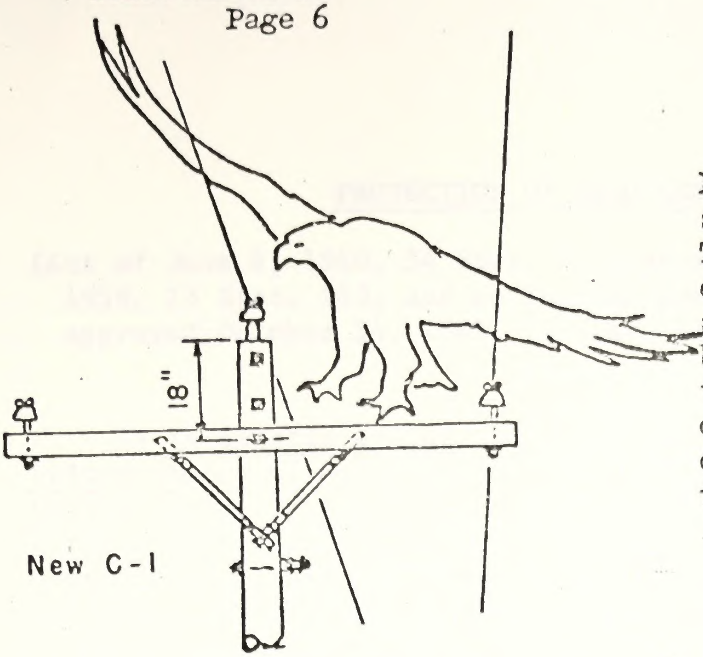
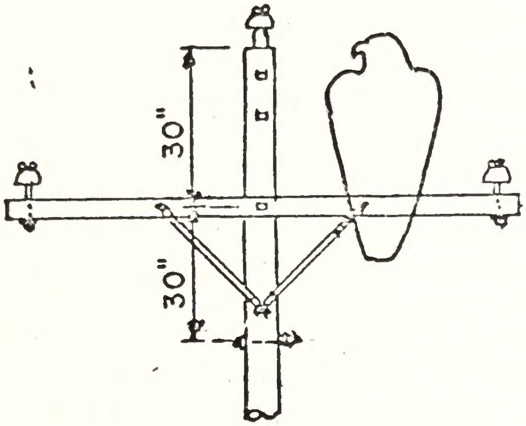


Figure 9

Figure 9 shows the post-1962 REA standard three-phase construction. The use of wood braces and the lowered crossarm should make this structure relatively safe for large birds. However, in the event electrocutions are experienced, the center phase should be covered as described in the preceding paragraph to avoid phase-to-phase contacts.



Proposed three-phase line assembly for eagle areas.

Figure 10

New Three-Phase Construction

For new construction in areas frequented by eagles and other large birds, it is recommended that the crossarm and neutral conductor be lowered as shown in Figure 9. All other features of standard construction including positioning of the ground wire and the use of wood crossarm braces should be as shown in REA standard drawings.

Other New Construction

Single-phase construction should be in accordance with Figure 2.

Single-phase transformer installations should make use of transformers which permit covering of energized parts and jumpers.

PROTECTION OF BALD AND GOLDEN EAGLES*

(Act of June 8, 1940, 54 Stat. 250, as amended by Act of June 25, 1959, 73 Stat. 143, and as further amended by Public Law 87-884, approved October 24, 1962, 76 Stat. 1246; 16 U.S.C. 668-668d)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, Whoever, within the United States or any place subject to the jurisdiction thereof, without being permitted to do so as hereinafter provided, shall take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or in any manner, any bald eagle commonly known as the American eagle, or any golden eagle, alive or dead, or any part, nest, or egg thereof of the foregoing eagles, shall be fined not more than $500 or imprisoned not more than six months, or both: Provided, That nothing herein shall be construed to prohibit possession or transportation of any bald eagle, alive or dead, or any part, nest, or egg thereof, lawfully taken prior to June 8, 1940, and that nothing herein shall be construed to prohibit possession or transportation of any golden eagle, alive or dead, or any part, nest, or egg thereof, lawfully taken prior to the addition to this Act of the provisions relating to preservation of the golden eagle.

Sec. 2. Whenever, after investigation, the Secretary of the Interior shall determine that it is compatible with the preservation of the bald eagle or the golden eagle to permit the taking, possession, and transportation of specimens thereof for the scientific or exhibition purposes of public museums, scientific societies, and zoological parks, or for the religious purposes of Indian tribes, or that it is necessary to permit the taking of such eagles for the protection of wildlife or of agricultural or other interests in any particular locality, he may authorize the taking of such eagles pursuant to regulations which he is hereby authorized to prescribe: Provided, That on request of the Governor of any State, the Secretary of the Interior shall authorize the taking of golden eagles for the purpose of seasonally protecting domesticated flocks and herds in such State, in accordance with regulations established under the provisions of this section, in such part or parts of such State and for such periods as the Secretary determines to be necessary to protect such interests: Provided further, That bald eagles may not be taken for any purpose unless, prior to such taking, a permit to do so is procured from the Secretary of the Interior.

Sec. 3. That for the efficient execution of this Act section 5 of the Migratory Bird Treaty Act of July 3, 1918 (40 Stat. 755), as amended by the Act of June 20, 1936 (49 Stat. 1555), shall be deemed to be incorporated herein in haec verba.

Sec. 4. That as used in this Act "whoever" includes also associations, partnerships, and corporations; "take" includes also pursue, shoot, shoot at, wound, kill, capture, trap, collect, or otherwise willfully molest or disturb; "transport" includes also ship, convey, carry, or transport by any means whatever, and deliver or receive or cause to be delivered or received for such shipment, conveyance, carriage, or transportation.

Sec. 5. That moneys now or hereafter available to the Secretary of the Interior for the administration and enforcement of the aforesaid Migratory Bird Treaty Act of July 3, 1918, shall be equally available for the administration and enforcement of this Act.

---

*Note: Preamble to Act of June 8, 1940 reads as follows:

"Whereas the Continental Congress in 1782 adopted the bald eagle as the national symbol; and

"Whereas the bald eagle thus became the symbolic representation of a new nation under a new government in a new world; and

"Whereas by that Act of Congress and by tradition and custom during the life of this Nation, the bald eagle is no longer a mere bird of biological interest but a symbol of the American ideals of freedom; and

"Whereas the bald eagle is now threatened with extinction: Therefore"

Preamble to Public Law 87-884 reads as follows:

"Whereas the population of the golden eagle has declined at such an alarming rate that it is now threatened with extinction; and

"Whereas the golden eagle should be preserved because of its value to agriculture in the control of rodents; and

"Whereas protection of the golden eagle will afford greater protection for the bald eagle, the national symbol of the United States of America, because the bald eagle is often killed by persons mistaking it for the golden eagle: Now, therefore....."

STATE ____________________

RAPTOR MORTALITY REPORT

1. Date of discovery

2. Approximate date when mortality occurred

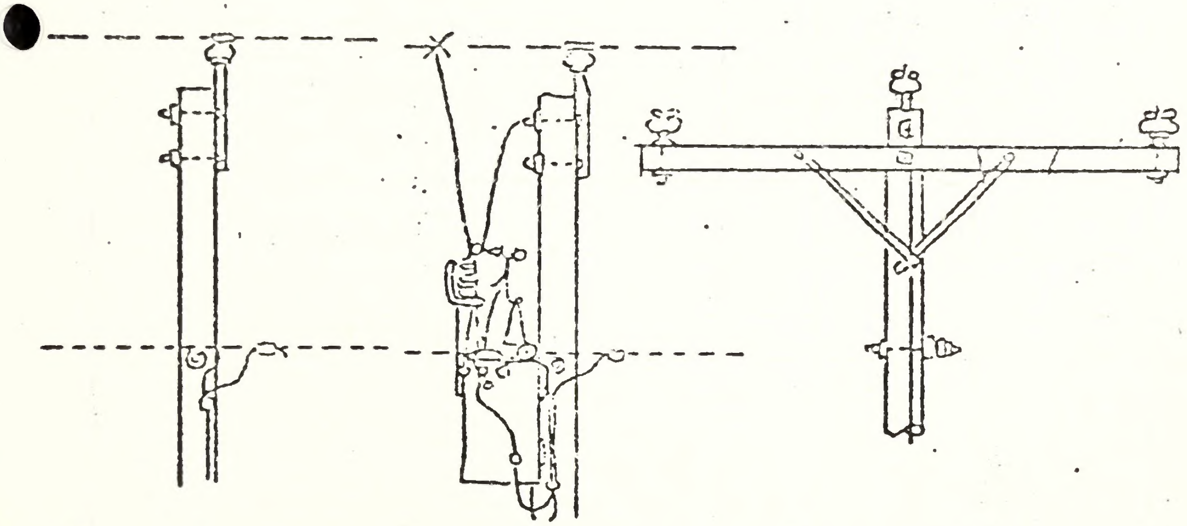
3. Location (county, nearest post office, township, name of electric utility and pole number)

4. Species, age, sex (if known) of each bird found

5. Probable cause of mortality (electrocution, gunshot, etc.)

6. Vegetation (forest, grassland, etc.) and terrain (hilly, flat, etc.)

7. Check pole type from those below



___ No crossarm

___ No crossarm, but transformer present

___ Crossarm(s)

___ Other (describe on back)

8. Disposition of carcass (left, picked up, etc.)

9. Name, address, phone number and agency of person making report

Send Report to: State Supervisor
Division of Wildlife Services
Bureau of Sport Fisheries and Wildlife

ATTACHMENT #14

STAGES OF IMPLEMENTATION	EXPLORATION					
DISCRETE OPERATIONS	Magnometer	Drill Seismograph	Vibraseis	Gravimeter	Geologic Survey Parties	REMARKS
III. ECOLOGICAL INTERRELATIONSHIPS						
A. ECOLOGICAL PROCESSES	0	-L	-L	0	-L	Only if the presence o man is considered to b foreign to ecological interrelationships
B. HAZARDS TO HUMAN AND ANIMAL HEALTH AND SAFETY	-L	-L	-L	-L	-L	No particular hazard e cept due to the necessity to use equipment surface & aerial. A hazard is there.
IV. AESTHETICS						
A. VISUAL	0	-L	-L	-L	-L	Very slight due to lig activities - trails, e of each item.
B. SOUND	0	-L	-L	0	0	
C. ODOR	0	0	0	0	0	
D. TASTE OR TOUCH	0	0	0	0	0	
E. MOOD ATMOSPHERE						
V. HUMAN INTEREST VALUES						
A. EDUCATIONAL/SCIENTIFIC						
Archeological	0	-L	-L	-L	-L	In event some sites ar damaged
Geological	+H	+H	+H	+H	+H	
B. HISTORICAL	0	0	0	0	0	
C. CULTURAL	0	0	0	0	0	
D. OTHER						

CHECKLIST

Remarks: Alternatives: "no action=only impact would be severe impact on local econom & slight impact on supply of nation's natural resources. 2. Lease with restricted area this would have the same impacts as described below on areas when drilling would be allowed. Where drilling would be restricted there would be no impact.

STAGES OF IMPLEMENTATION	EXPLORATION (includes pre-lease)					
DISCRETE OPERATIONS	Magnometer	Drill Seismograph	Vibraseis	Gravimeter	Geologic Survey Parties	REMARKS
I. NON-LIVING COMPONENTS						
A. LAND						
Soil Erosion	0	-L	-L	0	0	
Soil Pollutants	0	-L	0	0	0	
Land Use Capability	0	0	0	0	0	
B. WATER						
Sediment Load	0	-L	-L	0	0	May occur due to surfac disturbance & subsequent erosion
Turbidity	0	-L	-L	0	0	
C. AIR						
Particulate Matter	0	-L	-L	0	0	
Carbon Monoxide	-L	-L	-L	-L	-L	Result of overland & aerial travel equipment very slight
Hydro Carbons	-L	-L	-L	-L	0	
II. LIVING COMPONENTS						
A. PLANTS						
Grasses	0	-L	-L	0	0	
Forbs	0	-L	-L	0	0	
Shrubs	0	-L	-L	0	0	
B. ANIMALS						
Mammals	0	-L	-L	0	-L	Slight disturbance of activities of animals due to the presence of man & machine breaking up the routine.
Birds	0	-L	-L	0	-L	
Reptiles & Invertebrates	0	-L	-L	0	-L	
C. HUMANS						
Economic		+L				
Cultural		L				Controversial

Remarks:

STAGES OF IMPLEMENTATION	DEVELOPMENT					
DISCRETE OPERATIONS	Above Ground Pipeline	Reserve Pit, Drilling Tank Batteries	Prod. water, Disp. pit, Assoc. activ.	Waste Disposal	Roads & drill pads (construction)	REMARKS
I. NON-LIVING COMPONENTS						
A. LAND						
Soil Erosion	-L	0	-L	0	-M	
Soil Pollutants	0	-M	-M	-M	0	
Land Use Capability	X	-L	0	0	-M	
B. WATER						
PH	0	-L	-L	X	X	All items depend on proximity to water & t practices of contamina & control - Checklist made under present pra tices of cutting res. pits - Allowing frac. water to flow freely,e
Nutrients	0	X	X	0	X	
Sediment Load	X	-L	-L	0	-M	
Chemicals & Toxic Substances	0	-M	-L	X	0	
C. AIR						
Temperatures	0	0	X	X	X	May raise temp. due to g blooie line or reflecti from cleared road & pad
Particulate Matter	0	0	-L*	-L*	-M*	
Carbon Monoxide	0	-L	-L*	-L*	-L*	*Due to burning &/or du
Hydrocarbons	-L	-M*	-M*	0	0	*Impact depends on precautions taken to avoid accidental spills or sloppy operating practices.
II. LIVING COMPONENTS						
A. PLANTS Grass	-L	-H	-M	-M	-H	Impact due to clearing
Forbs	-L	-H	-M	-M	-H	
Shrubs	-L	-H	-M	-M	-H	
Conifers	-L	-H	-M	-M	-H	
Broadleaf	-L	-H	-M	-M	-H	
B. ANIMALS						
Mammals	-L	-L	-M	-L	-M	
Birds	0	-L	-M	-L	-L	
Reptiles & Invertebrates	-L	-L	-M	-L	-M	
C. HUMANS						
Economic	+H	+H	+L	0	+L	
Cultural Pattern	H	H	-L	0	H	Controversial
Social						

STAGES OF IMPLEMENTATION	DEVELOPMENT					
DISCRETE OPERATIONS	Above Ground Pipeline	Reserve Pit, Drilling Tank Batteries	Prod. water, Disposal pit, Assoc. activ.	Waste Disposal	Roads & drill pads (construction)	REMARKS
III. ECOLOGICAL INTERRELATIONSHIPS						
A. ECOLOGICAL PROCESSES						
Ecological Stress	-L	-M	-M	-L	-M	
Productivity	X	-L	-L	0	-M	
B. HAZARDS TO HUMAN AND ANIMAL HEALTH AND SAFETY	-L	-H	-M	-L	-M	
IV. AESTHETICS						
A. VISUAL						
Surface	-L	-H	-H	-M	-H	
Atmosphere	0	-M	-L	-L	-M	Due to visible smoke, dust & structures.
B. SOUND	0	-M	-L	0	-M	
C. ODOR						
D. TASTE OR TOUCH						
E. MOOD ATMOSPHERE						
V. HUMAN INTEREST VALUES						
A. EDUCATIONAL/SCIENTIFIC						
Archeological	-L	-H	-H	-M	-H	Possible high damage i areas not properly ide tified.
Geological	0	-L	0	0	0	
B. HISTORICAL						
C. CULTURAL						
D. OTHER						

Remarks: ____________________

STAGES OF IMPLEMENTATION	PRODUCTION						
DISCRETE OPERATIONS	Above Ground Pipeline	Roads (maintenance)	Drill Pads	R/W	Structures	Blowoff Pit	REMARKS
I. NON-LIVING COMPONENTS							
A. LAND							
Soil erosion	0	-M	-M	-M	0	X	
Soil pollutants	-L	0	-L	-M*	-M*	-M	*In case of leak or brea
Land Use capability	-L	-M	*0	*0	0	-M	*If properly rehabilitated
B. WATER							
PH		0	0	0	0	X	
Sediment Load		-L	-L	-L	0	X	Will depend on amount & success of rehabilitatio
Dissolved solids		0	0	0	- X	-X	
C. AIR							
Particulate matter		-M	-L	-L	0	0	Due to vehicle travel & dust.
Carbon monoxide		-M	0	0	X	X	
Hydro carbons		0	0	-M	-M	-M	In event of malfunction or poor maintenance allowing leaks or breaks & subsequent discharge of hydrocarbons
II. LIVING COMPONENTS							
A. PLANTS Grasses		-H	+M	+H	0	-M	
Forbs		-H	+M	+M	0	-M	Beneficial impact is result of revegetative practices. Area has been cleared of competition allowing recovery thus improved conditions.
Shrubs		-H	+M	+M	0	-M	
Conifers		-H	-L	-L	0	-M	
Broadleaf trees		-H	-L	-L	0	-M	
B. ANIMALS							
Mammals		-L	0	0	-L	-L	*only if R/W is powerlin it may affect larger species.
Birds		0	-L	-M*	-L	-M	
Reptiles & Invertebrates		-M	-L	-L	0	-M	
C. HUMANS							
Economic	+L	+H	+H	+H	+H		
Cultural	-L	H	M	H			Controversial
Social	-L	H	[illegible]	H	[illegible]		Controversial

STAGES OF IMPLEMENTATION		PRODUCTION					
DISCRETE OPERATIONS	ABOVE GROUND PIPELINE	ROADS Maintenance	Drill Pads	R/W	Structures	Blowoff Pit	REMARKS
III. ECOLOGICAL INTERRELATIONSHIPS							
A. ECOLOGICAL PROCESSES							
Ecological Succession		-H	-L	-L	0	-M	
Sensitivity to Change		-H	-M	-M	-L	-L	
B. HAZARDS TO HUMAN AND ANIMAL HEALTH AND SAFETY	-L	-M	-L	-L	-M	X	
IV. AESTHETICS							
A. VISUAL							
Surface		-H	-M	-M	-H	-L	
Atmosphere	-M	-L	0	0	-L	-L	
B. SOUND		-L	0	0	-M	0	
C. ODOR		0	0	0	-L	-M	
D. TASTE OR TOUCH							
E. MOOD ATMOSPHERE	-M						
V. HUMAN INTEREST VALUES							
A. EDUCATIONAL/SCIENTIFIC							
Archeological		-L	0	-H	0	-L	
Geological		0	0	0	0	0	
B. HISTORICAL							
C. CULTURAL							
D. OTHER							

CHECKLIST

Remarks: All components are considered with the assumption that the recommended mitigating measures have been complied with

STAGES OF IMPLEMENTATION	ABANDONMENT					
DISCRETE OPERATIONS	Surface Disturbance-Drill Pads-Roads, Pipelines, etc.	Surface Cleanup (Litter)				REMARKS
I. NON-LIVING COMPONENTS						
A. LAND	+M	+M				Compared to Production Phase
B. WATER	+M	+M				
C. AIR	+L	X				
II. LIVING COMPONENTS						
A. PLANTS	+H	+L				
B. ANIMALS	+M	+H				
C. HUMANS	+L	+M				

STAGES OF IMPLEMENTATION	ABANDONMENT					
DISCRETE OPERATIONS	Surface Disturbance-drill pads-roads, pipelines, etc.	Surface Cleanup (Litter)				REMARKS
III. ECOLOGICAL INTERRELATIONSHIPS						
A. ECOLOGICAL PROCESSES	+L	+L				
B. HAZARDS TO HUMAN AND ANIMAL HEALTH AND SAFETY	X	+M				
IV. AESTHETICS						
A. VISUAL	+M	+M				
B. SOUND	0	0				
C. ODOR	0	+L				
D. TASTE OR TOUCH						
E. MOOD ATMOSPHERE	+M	+M				
V. HUMAN INTEREST VALUES						
A. EDUCATIONAL/SCIENTIFIC	0	0				
B. HISTORICAL	0	0				
C. CULTURAL	0	0				
D. OTHER						

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